Smithsonian

January 1997

Chicken delight

The fairest fowl in the land can be found at shows, not the supermarket (p. 56)

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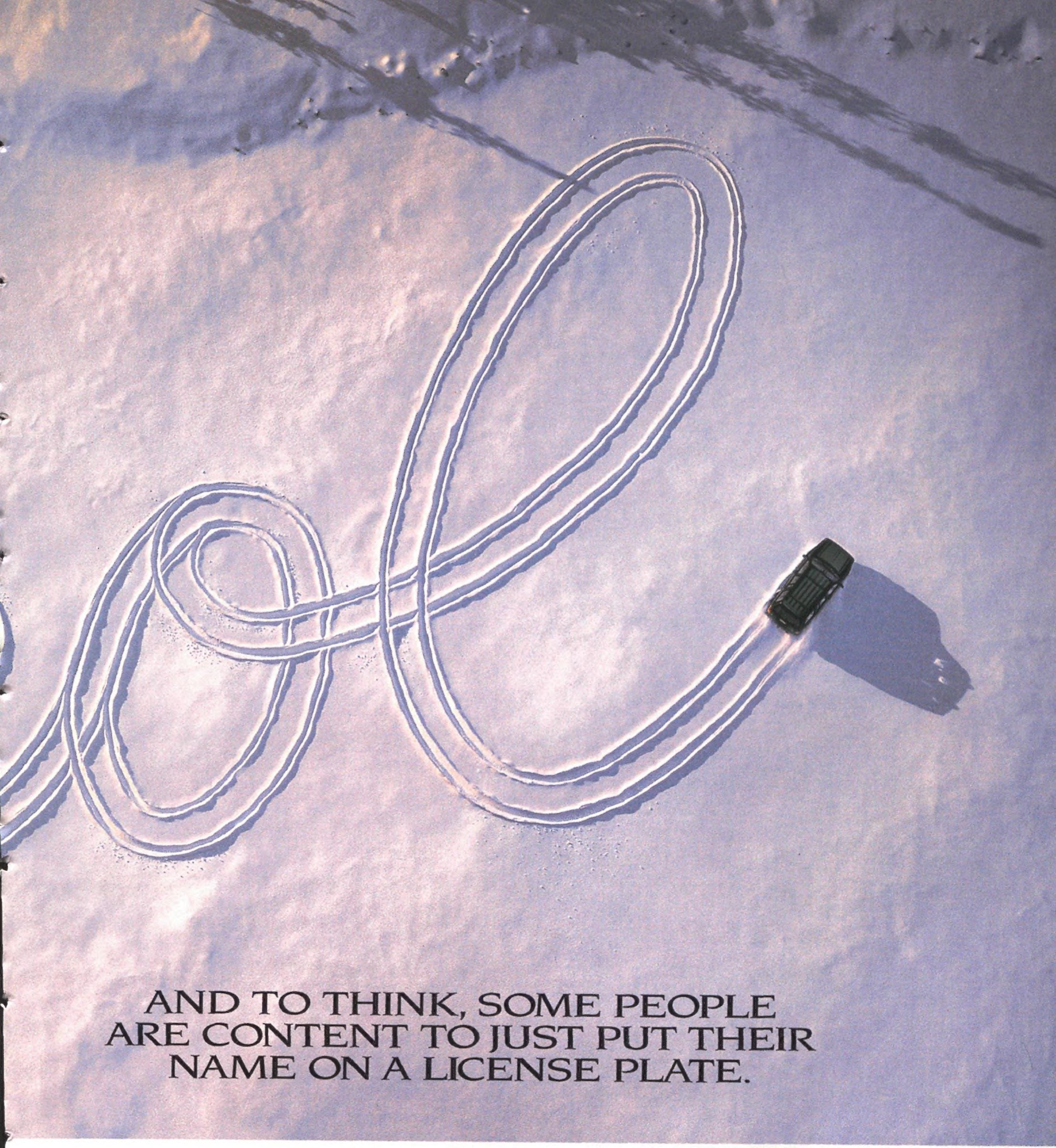

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Smithsonian *features*

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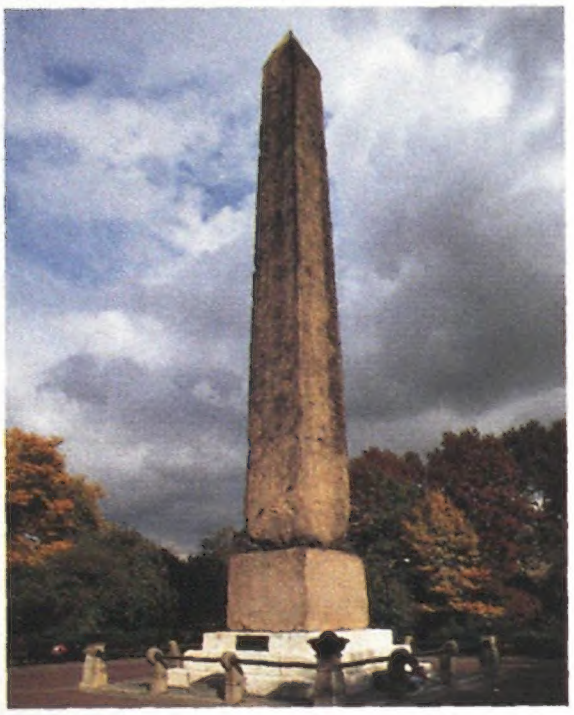

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Smithsonian *departments*

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Cover

Cover:
The punk-rocker look of the blue-laced buff Polish rooster, bred by fancier Joe Stromei of Los Angeles, is characteristic of the Polish breed. One of the most ornamental of chickens, the Polish dates from the 1500s and is a long-established domesticated breed (p. 56)
Photograph by Eric Sander

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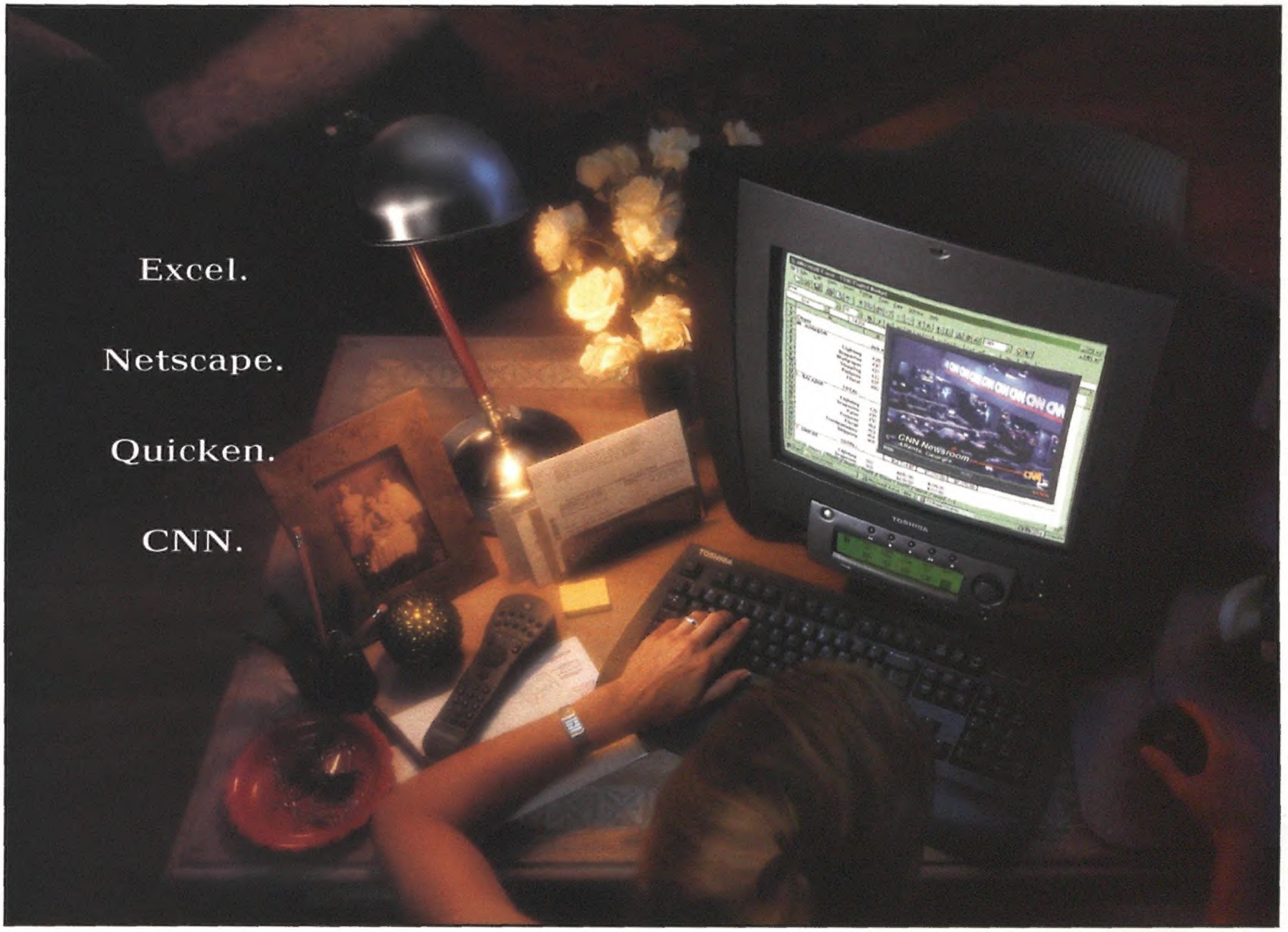

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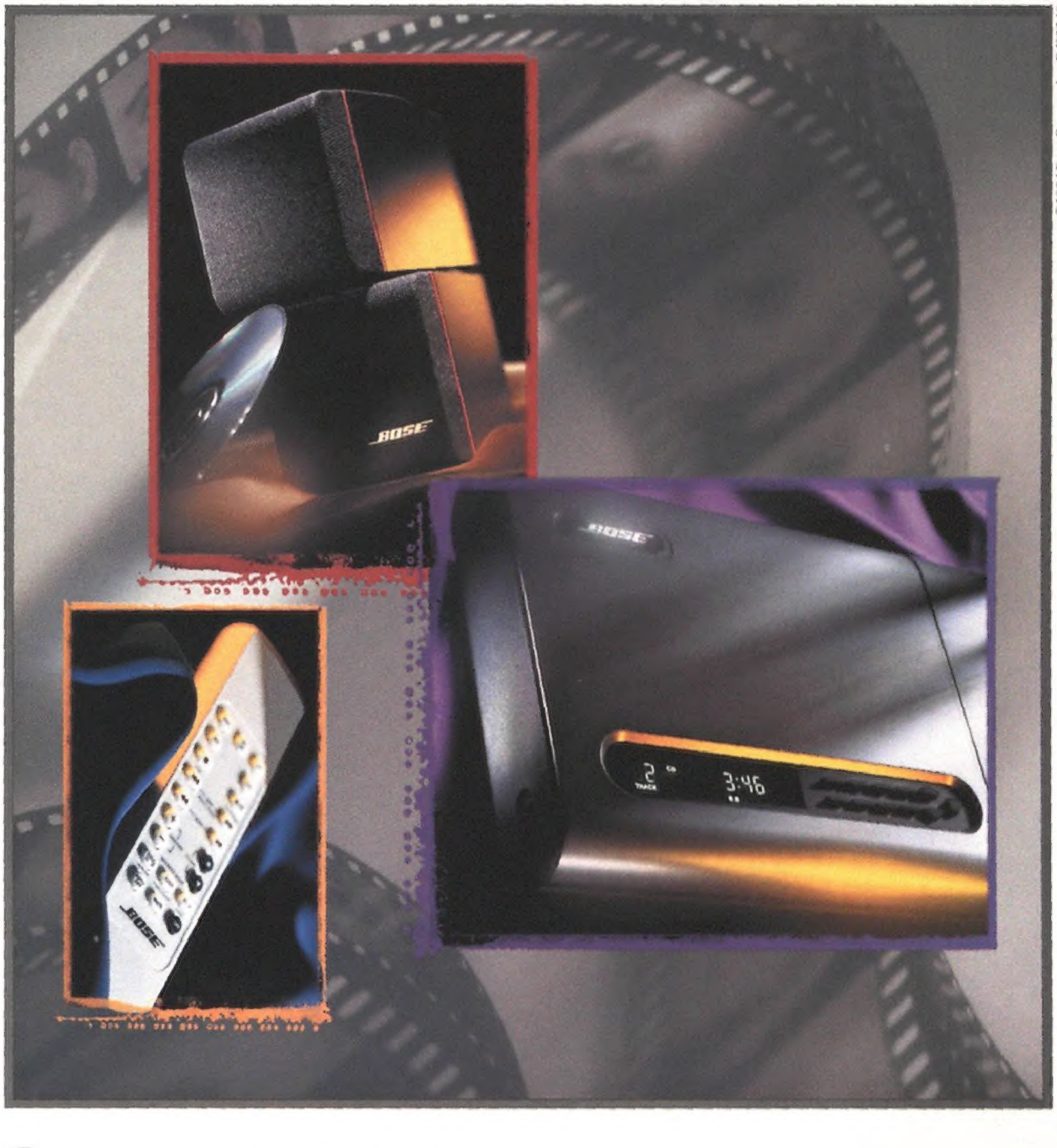

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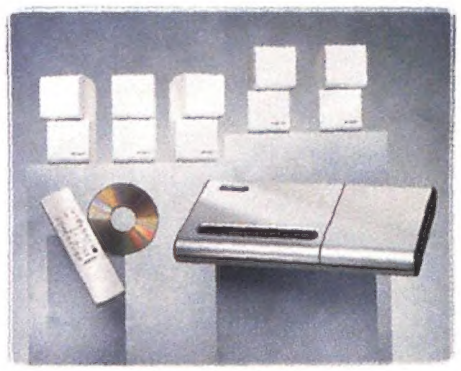

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Secretary Heyman's comments

Smithsonian Perspectives

In the ever-expanding field of anthropology, the Smithsonian still excels in research and exhibition

The American Anthropological Association held its annual meeting in San Francisco in November, bringing together a large number of anthropologists from universities, colleges and other organizations. A Presidential Symposium featured presentations primarily by members of the Department of Anthropology of the National Museum of Natural History (NMNH). Titled "The 150th Year of Smithsonian Anthropology," the session celebrated the importance of the Smithsonian in the founding of anthropological studies. I was privileged to chair the session.

The meetings underscored for me how rapidly the focus of interest in fields like anthropology broadens and how venerable institutions like the Smithsonian seek to accommodate such change. Anthropology is an embracive social science most broadly defined as the study of the origin of humans and of their physical, social and cultural development. Smithsonian anthropology started as the study of Native American cultures, languages and history. In 1846, the Regents asked that collections be procured for the Institution "illustrating the natural history of the country, and more especially the physical history, manners and customs of the various tribes of aborigines of the North American continent." Enormous collections followed.

In 1879, with the establishment of the Bureau of American Ethnology (BAE) as an independent division of the Smithsonian, American anthropology was institutionalized for the first time. Charged with carrying out research on American Indian cultures, including ethnology, archaeology and linguistics, the bureau operated as a separate entity until it was merged with a then-mature and research-oriented Department of Anthropology at the NMNH in 1965. In its 86 years, the BAE published numerous bulletins and reports, premier publications in anthropology. Meanwhile, the NMNH's Department of Anthropology focused on adding to and caring for the enormous collections of cultural, physical and biological objects, and organizing exhibitions. Most of these had to do with the Americas. Starting in the 1950s, however, anthropological research and curatorship was extended to the Pacific, Asia and Africa.

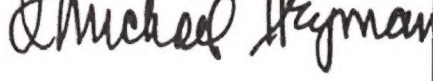
The range of anthropological research and exhibitions at the NMNH was illustrated at the meeting by various presentations including, on the research side, talks on human skeletal biology, the origins of agriculture in the Americas, the significance of objects to anthropological research at the Smithsonian, and archaeological studies of the first Americans. The Institution's involvement in exhibitions was reflected in presentations about the Smithsonian's past and present displays of Eskimo and African cultures, as well as its Festival of American Folklife as a museum-like exposition of contemporary cultures.

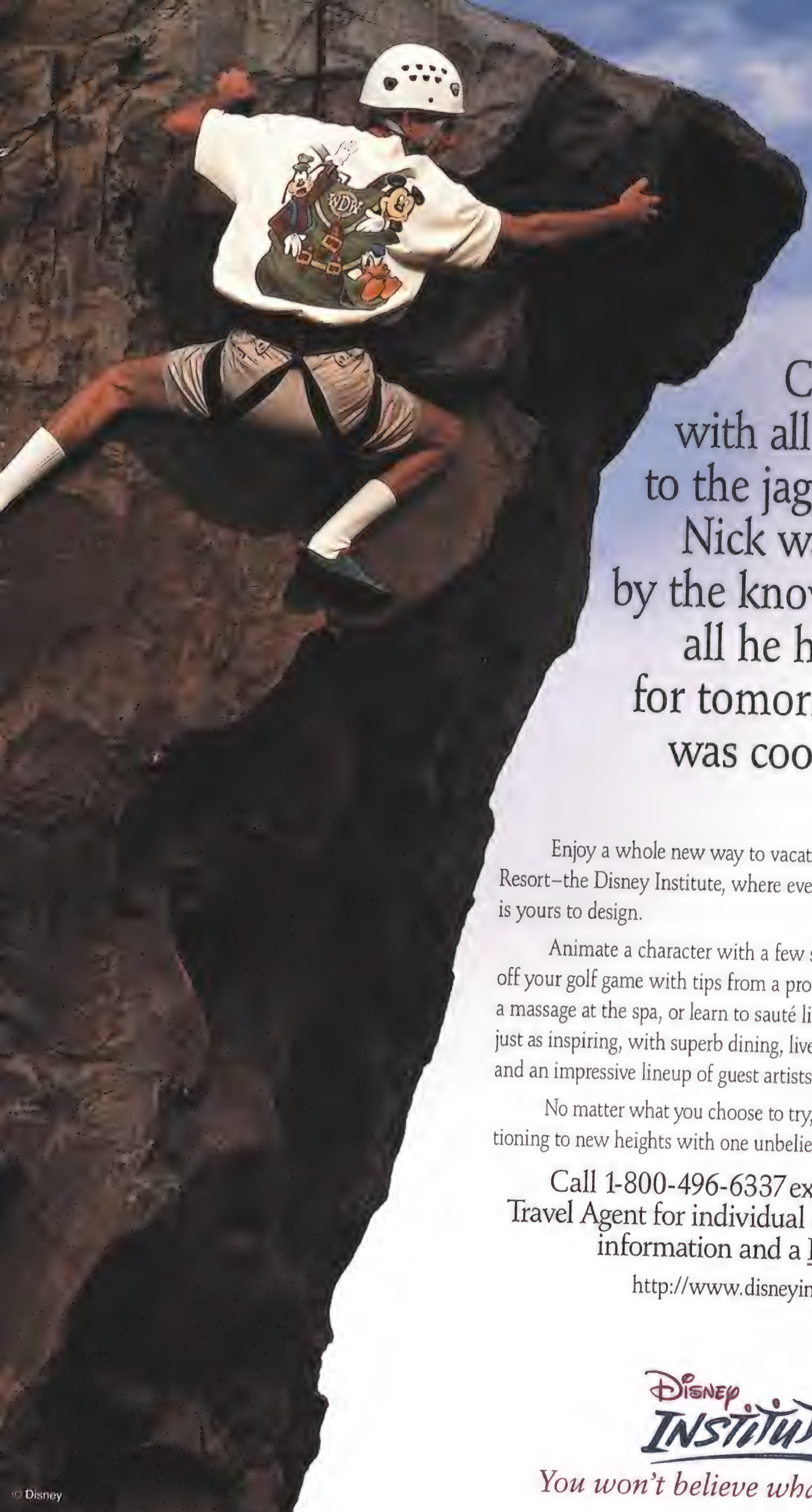
All social sciences overlap. Anthropology, however, seems broader than the rest, for its practitioners use the tools of the natural sciences (for instance, paleontology, biology and geology), the humanities (literature, linguistics and history), as well as other social sciences, including law. Moreover, the topics and modes of inquiry change. Looking through the program of the November meeting, I was struck by the number of sessions devoted to contemporary subjects and new kinds of inquiries. This is illustrated by the groupings within the American Anthropological Association, which include, for instance, ones concerned with psychological, urban, visual, environmental, feminist and nutritional anthropology. A sampling of sessions covered issues concerning elementary education; culture, politics and identity in contemporary Africa; perspectives on deviance and drug use; gender, sexuality and kinship in the new Western Europe; and anthropological approaches to nutrition in contemporary populations in the United States.

How can the Smithsonian cope with a field that is expanding in such dramatic ways? In 1994, our primary academic advisory committee, the Smithsonian Institution Council, presented a complex report that addressed a number of questions including those related to the expanding scope of anthropology.

The insights that appear most helpful in guiding future actions were: (1) the need to make choices in an era of constrained resources; (2) the strength of our activities in natural-science-based programs in anthropology, such as skeletal biology, archaeobiology and paleo-Indian archaeology, and their relationship to other science departments of the NMNH; (3) the richness of anthropological collections and archives within the NMNH and elsewhere in the Institution, and their potential for the study of ethnology; (4) the need to nourish relationships and communication among anthropologists working in a host of Smithsonian units, such as the National Museum of the American Indian, American History, Natural History and African Art, as well as the Center for Folklife Programs and Cultural Studies, the Smithsonian Tropical Research Institute and the Anacostia Museum's Center for African-American History and Culture; and (5) the usefulness of flexible and small exhibitions that address contemporary issues and explore similarities and differences between peoples.

The opportunities are considerable for shaping how the Smithsonian continues to be a major participant in anthropological research and exhibition. The new Provost has the subject under advisement and, as an initial step, is bringing together participants from various units who share common interests.





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Letters to the Editor

Dog Genome Initiative

Donald McCaig's excellent article in the November issue on the research of Jasper Rine and the Dog Genome Initiative should become the educational landmark in the world of dog breeding. It is hoped that all serious breeders and the American Kennel Club will heartily support Rine and his team of dedicated Berkeley geneticists.

Toward the end of the 18th century, as a result of the agricultural revolution in Britain and the Highland Clearances in Scotland, vast tracts of the Scottish Highlands became available for sheep raising on an industrial scale. Until then, few sheep were raised and those that were, were not the wool or meat-producing types. Farmers often crossbred their farm collies with lurchers and greyhounds to produce a dog that would be useful on hunts. When the need arose to control wild sheep scattered over thousands of acres of wild mountains, the practice of crossbreeding became more refined. The introduction of herding trials in 1878 further accelerated the development of the Border collie, which ranks today as the number one sheep-herding breed in the world.
Lois R. Russell
District Director and Chairman, Retired
Working Collie Committee
Collie Club of America
Redding, Connecticut

Donald McCaig said in his article that Dixie can, "without any assistance from humans, shell and eat pistachio nuts." This peculiar ability of a giant dog to locate and "unpackage" some tiny delicacy is one more strong trait well known to Newfoundland owners. Our Landseer Newf, Odin, especially enjoys peppermints after first untwisting the cellophane wrap at both ends. He has also been known to remove the cork from a brandy bottle without chewing it and consume the contents without spilling. Newfies have not only "soft mouths" but also fine dexterity with their little front teeth. We have always wondered what evolutionary advantage this unusual talent conferred.
Tom and Nancy DuVal
Barrington Hills, Illinois

I suggest that Jasper Rine cross-check his work by taking genetic samples from John McEnroe, who shows great interest in chasing tennis balls, and Mark Spitz, whose affinity for water is superb (I don't know how well he does at fetching sticks, however).
Stephen H. Heberlein
Jefferson, Oregon

I applaud Jasper Rine's efforts to help dogs, but I wish he would work more with computer models than with living canines. To find "hybrids between existing breeds," one need look no farther than the newspaper's classified ads, breed-rescue groups and the humane society. I found my three-legged collie-mix "3" at the latter.
Kathleen M. Burke
Member, American Shih Tzu Club
Greenville, South Carolina

I threw my renewal notice to SMITHSONIAN in the wastepaper basket one morning, having decided that I subscribe to more magazines than I can peruse. I retrieved the notice after reading about Gregor and Pepper. How could I possibly let such a great magazine go?
James E. Smith
Green Bay, Wisconsin

Know-Nothings

In his very interesting and timely article on the Know-Nothings, Robert Wernick holds up a mirror to our own times. Nativist forces are again declaring immigration to be a source of economic ills and societal corruption rather than being a central part of our identity.

The U.S. Census tells us that the percentage of foreign-born in the United States in 1994 was less than 9 percent, approximately half of what it was in the 1850s. History shows us that the Irish, German and Dutch hordes who so rattled the Republic in the 1850s later became part of our rich American culture, as did the Italians, Greeks and other southern Europeans who were distrusted and loathed in the 1920s.

Once again the movement of people from foreign lands challenges our notions of who we are and what we look like. Now the forces of history ask America to embrace the Latino, Chinese, Indian, Korean and more. Perhaps our current immigration turmoil is the harbinger of an expansion of who we are: richer, broader and, as before, better.
Alan M. Pampanin
Cambridge, Massachusetts

The caption for the illustration on page 156 misidentifies the location of the rally as "New York's Central Park in the mid-1850s." Frederick Law Olmsted's design was not accepted until 1858. The construction of the park took several more years.

The building in the picture, with its neo-classical facade and small dome, bears a resemblance to New York's City Hall. In the mid-1850s, before mass transportation, political events were likely to have been held at City Hall Park. In fact, as this century ends, I can write that I have attended three or four political demonstrations at City Hall but none in Central Park.
Arthur D. Tenenholtz
New York, New York

Red, Hot & Blue

Your fine story did not mention Fred Stone, my cousin, or Dave Montgomery, his longtime partner. They took *The Wizard of Oz* to sophisticated Broadway in 1906 even though critics said a kid's show wouldn't survive there. It was a big hit and made stars of them. Fred played the Scarecrow.

After Dave Montgomery died, Fred had many hits before he drove his Beech aircraft into the ground in Connecticut. He was slated to star in his last musical, *Smiling Faces*, and his friend Will Rogers replaced him. Fred recovered to take the show on the road, but it lacked the spectacular entrances he had previously brought to the stage from his boyhood as a circus acrobat.
Charles Stone
Borrego Springs, California

I have seen and loved many American musicals, my first being *Roberta* at the Nixon Theater in Pittsburgh in 1936. I have quit going, however, because of microphones and loudspeakers. Their use produces a distorted, unnatural sound. At a recent performance of *Starlight Express*, the mike of one of the singers failed and he could not be heard. Today's singers are unable to project. Can you imagine Mary Martin, Ethel Merman or Alfred Drake needing a microphone?
Jean G. Noble
Bethesda, Maryland

I wonder how Donald Dale Jackson missed mentioning *The King and I* in his otherwise delightful article about American musicals.
Ellen Wilde
Santa Fe, New Mexico

Your article didn't mention the rock opera *Rent.*
Alyson Ahlberg
Stratford, Connecticut

Why wasn't *Ain't Misbehavin'* among those in your article?
Gertrude Light
Palo Alto, California

I was sad that my all-time favorite musical, *Guys and Dolls,* was not included.
Mary W. Davis
Williamstown, Massachusetts

Although Irving Berlin did write "A Pretty Girl is Like a Melody" and "Mandy," it was Jack Norworth and Nora Bayes who wrote "Shine on, Harvest Moon." In any event, they don't write 'em like that anymore—no matter who wrote 'em.
Charles L. Edwards
Chicago, Illinois

Around the Mall and Beyond

Michael Kernan's column about the "How Things Fly" gallery at the National Air and Space Museum was most enjoyable. He mentioned that Col. Claire Lee Chennault's legendary 23rd "Flying Tiger" Fighter Group flew both the Curtiss P-40 Warhawk and North American Aviation's P-51 Mustang in China. I thought the Tigers flew only the P-40.
William Bee
Austin, Texas
Ace fighter pilot Don Lopez, who is NASM's deputy director, was a member of the "Flying

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IN FACT, WE SAID IT IN

JUST ONE WORD.

Tigers" and flew both Warhawks and Mustangs. Chennault recruited 112 pilots from the Army, Navy and Marine Corps who were officially known as the American Volunteer Group (AVG). The Flying Tigers of the AVG flew only P-40s (the planes with the giant grinning shark teeth painted on their noses) from December 1941 to July 1942. The 23rd "Flying Tiger" Fighter Group, which replaced the AVG, flew the P-40 Warhawks at first. Those fighters were gradually replaced by the P-51 Mustangs. Lopez flew 96 missions in P-40s and his last 5, in late 1944, in P-51s. Ed.

The Object at Hand

I first saw Phil Sheridan's horse, Rienzi, whom he later named Winchester, at the Smithsonian in the waning years of the 1930s. The city had been invaded by a convention of the Grand Party of the Republic—a horde of cane-carrying old men wearing dark suits, broad-brimmed hats and lapels full of medals. As my family and I moved about the Smithsonian treasures, which were jammed in higgledy-piggledy, we came upon a heated exchange in front of Winchester's case. The veteran held that the Institution was perpetuating a fraud on the American people by presenting "that hoss" as General Sheridan's famous mount. He claimed to have been Sheridan's groom throughout the Civil War and that he had taken "care of that damned hoss every day for three years, and that waan't him."

Although a museum staffer tactfully explained that the horse had aged 13 years between the time the veteran had last seen him and his death and that taxidermy was not a refined art in 1878, the former groom would not yield. My family and I moved on.

Walter K. Munkelwitz
Patchogue, New York

American sculptor Gutzon Borglum [SMITHSONIAN, August 1992] commemorated Col. Philip Sheridan's famous ride toward Cedar Creek in a heroic bronze monument in Washington, D.C. "Little Phil" and Rienzi charge east at full gallop down "Embassy Row" on Massachusetts Avenue, about a mile from the White House.

Harold F. Osborne
Edmonds, Washington

Although you identified Philip Sheridan as an "Irishman from rural Ohio," he was born in Albany, New York, on March 6, 1831. His parents, John and Mary Sheridan, came from Ireland in 1830 and lived with relatives here. Just before he was 2 years old, Sheridan and his parents moved to Somerset, Perry County, Ohio. As a famous son, Sheridan has a street and a small park in Albany named for him.

In 1916, Sheridan's widow and daughter attended the dedication of a statue of him astride Rienzi. The original monument was designed by sculptor John Quincy Adams Ward, and his pupil Daniel Chester French enlarged it. The monument is in East Capitol Park in front of the New York State Capitol. The pedestal for the statue was designed by architect Henry Bacon, who was collaborating with French at that time on the Lincoln Memorial in Washington, D.C.

Virginia B. Bowers
Historian, City of Albany
Albany, New York

Phenomena, Comment and Notes

In his Phenomena column, John P. Wiley cited some of the findings of the National Science Board in its 1996 report, specifically the chapter "Science and Technology: Public Attitudes and Public Understanding." The problem does not involve just our comprehension of esoteric scientific debates and definitions. Understanding science and technology in this day and age implies something beyond knowing that the earth revolves around the sun. Many people are turning to "pseudoscience and superstition" probably because the cardinal facts of the natural world are still a mystery to them. One would speak here for basic education, for adults as well as children, beginning with the things that are more or less given. Then perhaps we will have the foundation from which to venture into that unknown that science has opened up for us.

Linda L. Kohut
Oakland, Maryland

In your Phenomena column we read of the great concern over scientific illiteracy. The picture on page 34 shows two hyperbolic cooling towers above the caption: "Americans are evenly divided over the benefits and risks of nuclear power." Those towers have no unique nuclear function: they are one of the devices that are used to get rid of waste heat that is generated in all thermal power plants. They may appear on plants that burn fossil fuels as well as those that use nuclear reactors. Because of the scientific and engineering illiteracy of the media, however, these towers have become the visual trademark of nuclear power plants.

Albert A. Bartlett
Department of Physics
University of Colorado
Boulder, Colorado

Mr. Bartlett raises a good point. The facility we showed, however, is a nuclear power plant operated by the Duquesne Light Company in Shippingport, Pennsylvania. A small white dome at the right of the right tower is the housing for the nuclear reactor. The original 1957 reactor at Shippingport had been the cornerstone of Dwight D. Eisenhower's "Atoms for Peace" program. Although that reactor was shut down (SMITHSONIAN, October 1989), *this one remains active.* Ed.

Letters to the Editor

The letter from Gene Anne Parker referred to Le Corbusier as the author of the dictum "Less is more." Actually, that belongs to another architect, Ludwig Mies van der Rohe, who was a contemporary of Le Corbusier. My father, also an architect, is fond of misquoting it as "Less is more, more or less." My family has been groaning for years.

Elizabeth J. Monroe
St. Louis, Missouri

It was the Letters Editor who erred, not Ms. Parker. Ed.

SJMO (September 1996)

I enjoyed Chiori Santiago's feature on the accomplishments of David Baker and the Smithsonian Jazz Masterworks Orchestra (SMITHSONIAN, September 1996). I would like to point out, however, that the real architects of the sound of the Boyd Raeburn orchestras of the mid-1940s were arrangers such as Ed Finckel, George Handy, Johnny Richards and George Williams, who each offered unique contributions to my father's bands.

Bruce Boyd Raeburn
New Orleans, Louisiana

Letters for consideration in this column must include your full name, telephone number and postal mailing address. Transmit mail to edletters@aol.com or post it to Letters Editor, SMITHSONIAN, *900 Jefferson Drive, MRC 406, Washington, DC 20560. Letters may be edited for both clarity and length.*

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Around the Mall and Beyond

By Michael Kernan

By discovering heart disease early, echocardiograms have improved life for many a human; now Washington cardiologists are using them to help great apes at the National Zoo

Question: How do you give a 448-pound gorilla an EKG?

Answer: With a lot of help.

It takes ten people to lift a sedated hulk named Mopie onto the operating table at the National Zoological Park hospital. Actually, the 24-year-old silverback is getting much more than an electrocardiogram. For over an hour he will be put through some of the most sophisticated heart tests we have, including an exam with a transesophageal ultrasonic scope, part of a Doppler echocardiograph machine.

The scope is a silvery L-shaped tube, hardly a foot long, and it costs $48,000. It is hand-built, with 64 crystals that can be fired in phased sequence to vibrate and thus send sound waves into the heart; the waves that bounce back are digitally reconstructed into a video image. Inserted into the esophagus next to the heart, the instrument provides an extraordinary picture of that organ, its valves, the aorta and everything else, as it pumps away. What we have here is a charming switch: the latest developments in human medicine being used to benefit animals.

Lucy Spelman, left, other Zoo veterinarians, an anesthesiologist and a cardiologist prepare a silverback gorilla named Gus for his heart workup.

"Cardiovascular disease is a significant problem in orangutans and gorillas, especially male gorillas," Dr. Richard Cambre, head of the Zoo's Department of Animal Health, tells me. "We've done all nine of our orangutans and now are working on the nine gorillas with echocardiograms, blood pressure exams and blood workups for cholesterol and lipid levels."

Though zoo animals live longer than wild ones as a rule—35 years is the average age for gorillas; the record is 54—they tend to develop heart trouble. No one knows just why. Is it hypertension? Arteriosclerosis? And why the high cholesterol? Though the Zoo provides the apes with a diet that is as close as possible to what they would eat in the wild, are the apes missing some trace item, some leaf or plant that they find in the lowlands of Zaire and Cameroon?

"These exams will give us baseline stats," Cambre says, "so we can follow them in later years. One thing: we don't have heart data on gorillas while they're awake. We might be able to train orangutans to accept a blood pressure cuff, but gorillas, I don't know."

They are not ideal patients. When Dr. Lucy Spelman, associate veterinarian at the Zoo, approached Mopie earlier this morning with the dart gun that would anesthetize him, Cambre recalls, "he figured out what was going on before she had a chance to fire the dart, though he'd never seen this particular type of equipment before. He knew what was going to happen to him." So Mopie produced from the source a gigantic handful of fresh gorilla manure and hurled it at Dr. Spelman, spattering her from hair to heels.

Undaunted, she is in the operating room working away on Mopie with the rest of the doctors when I arrive. She has wiped the stuff off her glasses but is otherwise concentrating on what she has come here to do. All in a day's work. The place has a pungent smell, somewhat like a bad case of halitosis. The vets tell me this is the normal scent of a gorilla when he's scared.

The dart, fired from an air pistol, goes into the leg muscles and puts a gorilla down in 15 minutes or so. After that he is kept under anesthesia with isoflurane gas, inhaled through a tube.

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Now Mopie lies there with his silver-haired knees splayed and his giant paws curled like a sleeping child's fingers. A transducer clipped to his tongue tracks his blood oxygen saturation and pulse rate. His eyes are slightly open. The doctors bustle around him in their surgical masks and gloves, taking notes, checking the video monitors, moving probes about on his vast chest.

When I ask how she got into doing this, Dr. Spelman says simply that she always wanted to be a zoo vet. She was in private practice but prefers the variety of experience in a zoo. In one day she may help with a cardiac workup on a gorilla, do a root canal on a Sumatran tiger, take blood from a sea lion.

As Mopie's heart thumps away in living color on the Doppler machine, a frighteningly accomplished trunkful of electronics costing six figures and loaned by Hewlett-Packard as a friendly gesture, I talk to Dr. Steven Goldstein, one of three Washington cardiologists who have given up this Sunday and volunteered to help. I ask if Mopie's heart rate of 123 beats per minute, duly recorded on the monitor, is very bad.

"It would be bad for a human but might be not so bad for an ape. This may be mild for him." Goldstein does, however, see what appears to be a problem in the main pumping chamber, the left ventricle. Normal human ventricles eject 60-70 percent of the blood in a given contraction. In orangutans, the efficiency is down to 55-65 percent. Mopie's is as low as 35 percent.

"I think it's abnormal, but I've only seen 10 or 11 great apes," says Goldstein, who has been volunteering at the Zoo since September 1995. "He's the second gorilla that I've seen with this condition. His father died at 37 of a heart problem, but then his father was born in the wild. Apes do live artificially long in captivity."

The beauty of the Doppler machine, National Zoo primates curator Lisa Stevens tells me, is that you can literally watch and videotape the heart at work. A conventional heart x-ray might be obscured by the ribs and, besides, is two-dimensional and static. When the ultrasonic scope is inserted, you can see everything in motion, even the aortic valve opening and closing.

Stevens came to the National Zoological Park straight from Michigan State, 18 years ago. "I thought I'd do this for a few years, but then I realized that this

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was it. I started with cats, then bears, seals and sea lions. You become specialized eventually, but most people are very versatile. You work with all the animals, from elephants to fish. And you appreciate and respect them all."

Dr. Cambre, who came here two years ago after 15 years at the Denver Zoo, says that being a zoo veterinarian gets into your blood. "Animal personalities are fascinating. We have PhD curators here and a keeper staff that's mostly college educated. We depend on them to report unusual behavioral patterns for individual animals to us. Sometimes these are early warning signs of illness. It takes a team effort to figure out what's going on." Without an owner to tell them what an animal's problem is, Zoo people have to rely on their own close observations. Is an animal eating well? Defecating normally? Moody? Under stress?

On another of my visits to the Zoo, Azy, a large male orangutan, spotted Cambre as we strolled past. Azy rushed back and forth in his cage, pushing a huge barrel before him in an impressive display of power. "It's a lot of bluster," Cambre said. "He's trying to intimidate me. He knows who I am. He knows who's going to win if I get my dart gun. So he's bluffing. Of course, if I was stupid enough to wander into his cage, he'd kill me. They're forgiving up to a point. But they don't like us, because if they're sick we've got to dart 'em."

After the heart exam, as Mopie lies on his back, half covered by a blanket and breathing peacefully, Dr. Spelman cleans the gorilla's wicked-looking teeth with dental tools. Yes, even apes are prone to cavities and gum disease.

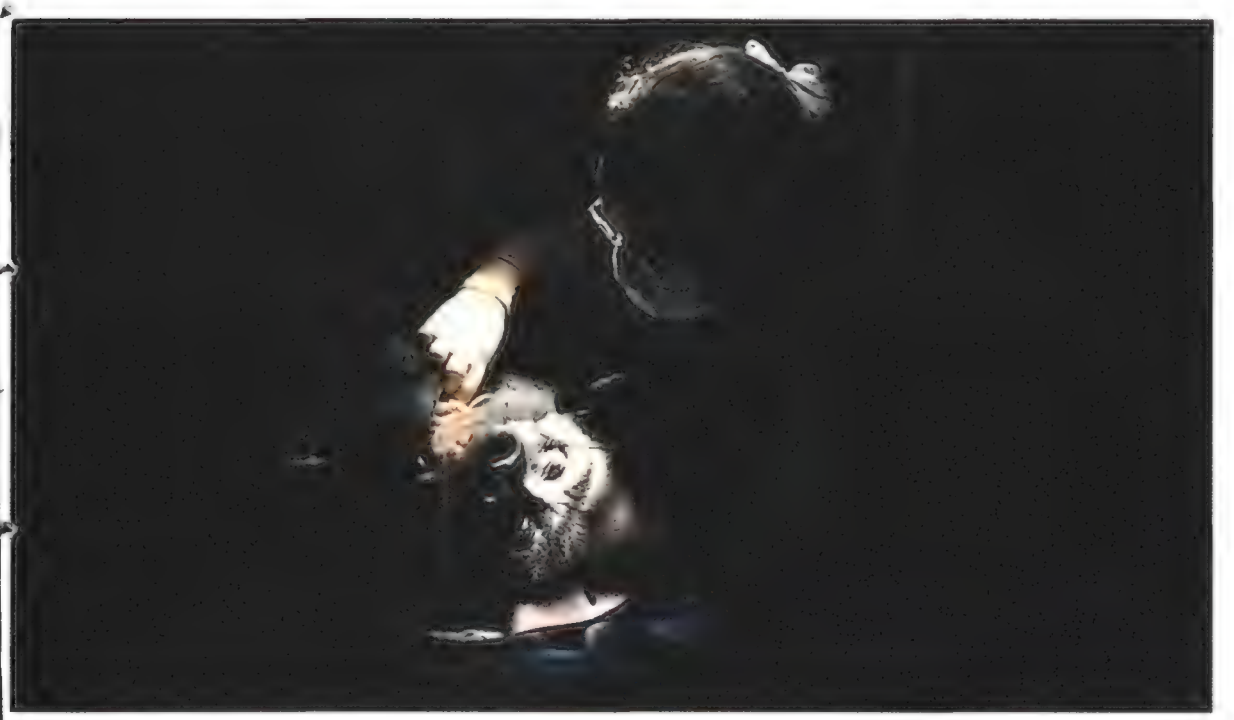
Now Mopie is being unplugged from the monitors and transferred to an x-ray table for a complete set of pictures. Even moving him from one table to another takes a half-dozen people hauling on the heavy canvas netting he's lying in.

"We'll take him off anesthesia when he's back in a cage," explains Stevens. "He'll recover pretty fast. He'll be groggy for the rest of the day, but awake and eating. He might be a little cross. He's into that role of being the big dominant male. Mopie can be sullen, but he has his light moments. By tomorrow he'll be back to normal."

The team struggles through narrow doorways with Mopie and deposits him in a van for the trip back to the ape house. There they tug and push him through barred passageways to a cage, where the anesthesia tube is removed. Immediately he begins to clear his throat, sounding exactly like my father in the morning. In a minute he starts to move, and the staff leaves to give the same round of tests to another gorilla.

I hear some serious screams and the pounding of bare feet as a large female named Mesou flees down a runway. Following her, holding a long dart gun, comes the intrepid Dr. Spelman in clean coveralls, her brown hair pulled back in a ponytail. She moves with deliberation, intent and calm.

The CO_2 gun pops. "There," she says. "That was a good one." Mesou sits down with a philosophic grunt.



While Gus is under anesthesia, Dr. Spelman periodically checks the color of his mucous membrane—pink is a sign that he is receiving enough oxygen.

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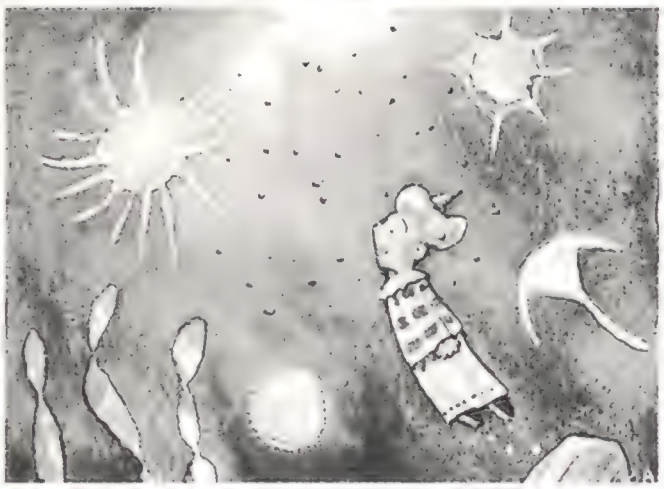

Scientists are researching the possibility that consumption of iron ions by plankton could play an important role in combating global warming.

Iron Saves the World

By Tomoyuki Kohara

There is a marine phenomenon known as "withered seashore." It occurs when the marine plants which normally grow in abundance in coastal seas wither and die, leaving the area barren—almost as if it had been ravaged by a forest fire.

Research has been pointing to one of the causes, the reduction of the iron content in sea water. Iron is known to play a crucial part in plant metabolism by virtue of its role in the transmission of electrons as part of the photosynthetic and respiratory chain.

Iron is being prevented by dams and barriers from being carried down to the sea, and the resultant lack of iron in coastal areas of Japan is a major factor in generating the withered seashore problem. Because the Japanese islands are composed of steep terrain, a large number of debris barriers have had to be erected to prevent natural disasters.

The answer to the problem may well be to sprinkle powdered iron into the sea in order to facilitate plant photosynthesis and thereby regenerate the luxuriant plant life of our seas. This may seem like a crazy idea, but it is in fact currently being considered in all seriousness by the scientific community, not as a means of curing the blight of withered seashores, but as a way of combating global warming.

In 1988, John Martin and Steve Fitzwater of the Moss Landing Marine Laboratories in California made the stunning suggestion that the Antarctic Ocean should be seeded with powdered iron in order to stimulate the growth of vegetable plankton, which would then collect in the surface areas of the ocean. The theory suggested that the plankton would be able to absorb carbon dioxide from the atmosphere and increase its ability to photosynthesize and assist the conversion of carbon dioxide, which plays a major part in global warming, to oxygen and water. Could iron turn out to be the savior of our planet?

About the Author

Tomoyuki Kohara is a science journalist who is interested in the materials of the life sciences, global environment, and ecosystems. He earned a master's degree from Hokkaido University in geocatalogy.

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Smithsonian Website

The Smithsonian home page on the World Wide Web (http://www.si.edu) offers on-line information about exhibitions, collections, events and products.

'America's Smithsonian'

George R. Brown Convention Center, Houston, Texas (through January 28) Centerpiece of the Institution's 150th anniversary celebration, the traveling exhibition of Smithsonian treasures continues its tour. *Note*: Admission is free, but passes are required. Advance passes are available for a service fee of $3.50 each by calling 1-800-913-TOUR. The Smithsonian Voices of Discovery program will sponsor a series of free public lectures January 6 - 10 and 13 - 17.

Special January Exhibitions, Events

National Museum of American History
From Frying Pan to Flying V: The Rise of the Electric Guitar (through September 30) Historic instruments and photographs track the invention, design and commercial success of the electric guitar. See *Highlights Continued*, page 20.
24 Hours in Cyberspace (January 23 - mid-April) Photojournalists dispatched to every continent document the paradoxes of life in cyberspace on a single day.

National Postal Museum (Located next to Union Station on Capitol Hill)
Chess Stamps (runs indefinitely) Stamps on display depict chess game pieces and famous chess players.

National Air and Space Museum
How Things Fly New permanent gallery elucidates the basic principles of flight, aerodynamics and propulsion.
The Enola Gay (runs indefinitely) Exhibition features the forward fuselage of the *Enola Gay*, the B-29 that dropped the atomic bomb on Hiroshima.

National Museum of Natural History
Poles Apart: Parallel Visions of the Arctic and Antarctic (January 15 - August 4) Photographs by Galen Rowell.
The Mighty Marlin (opens January 24) Model of the 14½-foot world-record black marlin caught in 1953.
Gem and Mineral Hall Gallery is closed for renovation until late 1997. The famous Hope Diamond is on view on the second floor of the Rotunda.

National Zoological Park
Amazonia Science Gallery Permanent exhibition looks at the work of Smithsonian biologists worldwide.

Freer Gallery of Art
Telling Tales in Japanese Art (through May 1) Hand scrolls, albums, screens, from the 13th through early 19th century, highlight Japanese visual narratives.

Arthur M. Sackler Gallery
Art of the Persian Courts (through April 6) Works reveal the spread and influence of Persian culture across the Islamic world from the 14th to 19th century.

National Museum of African Art
A King and His Cloth: Asantehene Agyeman Prempeh I (January 29-March 23) Show examines an "Adinkra" cloth that belonged to the king of the Asante nation in Ghana who ruled from 1888 to 1896.

Hirshhorn Museum & Sculpture Garden
Richard Lindner: Paintings and Watercolors, 1948-1977 (through January 12) Retrospective features the bold images of the German-born American artist.

National Portrait Gallery
Breaking Racial Barriers: African Americans in the Harmon Foundation Collection (January 31-September 14) Show features 20 portraits from the groundbreaking 1950s exhibition "Portraits of Outstanding Americans of Negro Origin."
Le Tumulte Noir: Paul Colin's Jazz Age Portfolio (January 31-September 14) Lithographs by the French poster artist capture the explosive performing presence of Josephine Baker.
Red, Hot & Blue: A Salute to American Musicals (through July 6) Exhibition spotlights the major personalities who created the American musical theater.

National Museum of American Art
American Kaleidoscope: Themes and Perspectives in Recent Art (through February 2) Works by 14 contemporary American artists whose art speaks to the variety and continuity of American culture.

Renwick Gallery
Conservation by Design (through January 12) Functional, sculptural wood objects illustrate issues of forest management.

Arts and Industries Building
Feeling the Spirit: Searching the World for the People of Africa and *Invoking the Spirit: Worship Traditions in the African World* (January 19-March 23) The work of *New York Times* photographer Chester Higgins jr.
The Black Trans-Atlantic Experience (January 19-March 23) Images by photographer Steven Marc.
Stories of the People (through August 10) Artifacts from the National Museum of the American Indian.

The Castle—Great Hall
Smithson's Gift New permanent display tells the story of the British scientist whose bequest founded the Smithsonian.

Anacostia Museum
Museum Renovation The museum will be closed for renovation for approximately ten months.

Heye Center, National Museum of the American Indian (New York City)
All Roads Are Good: Native Voices on Life and Culture (through February 1, 1998) Inaugural exhibition illustrates the diversity and continuity of Native cultures.

Cooper-Hewitt, National Design Museum (New York City)
Mixing Messages: Graphic Design in Contemporary Culture (through February 16) U.S. graphic design, 1980 - 1995.

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Highlights Continued

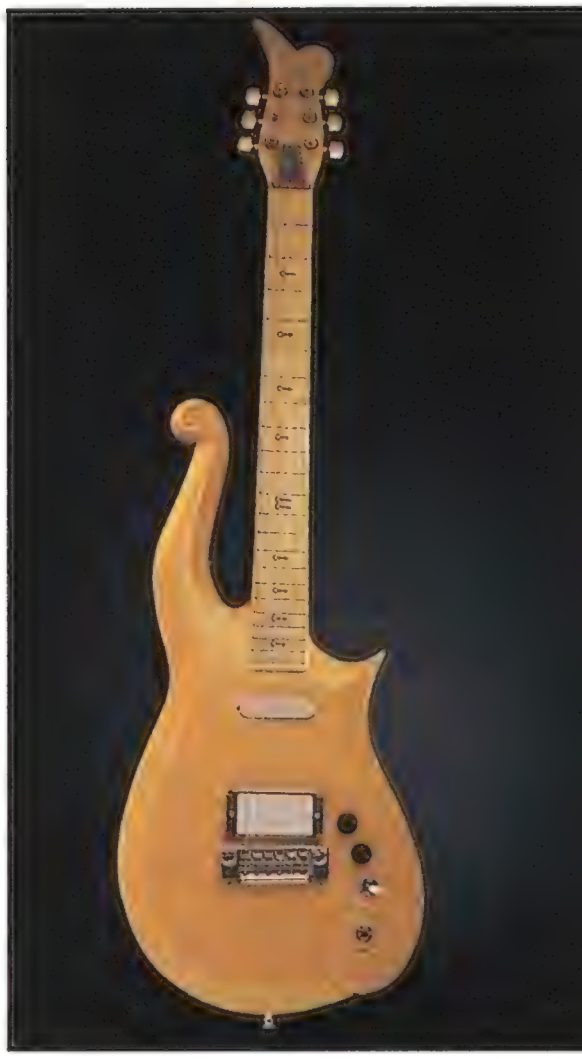
Plugged in, and playing with power

Its silhouette has become an icon of popular culture; its larger-than-life sound transformed modern music. Once shunned as a novelty and feared as subversive, the electric guitar is now equally at home in classrooms and concert halls, conservatories and garages. Its success sprung from the dynamic interplay of a medley of inventors, engineers, musicians, manufacturers, listeners and enthusiasts driven by the quest for a fuller, louder sound. From the Rickenbacker Frying Pan (below), the first commercially viable electric, to Prince's 1989 custom Yellow Cloud (right), the story of the electric guitar is a saga of American ingenuity and innovation.

The National Museum of American History traces this saga in a new exhibition—"From Frying Pan to Flying V: The Rise of the Electric Guitar"—sponsored by NMAH's Jerome and Dorothy Lemelson Center for the Study of Invention and Innovation, and the Chinery Collection. On view through September 30, the show illustrates how innovators combined the guitar with a pickup and an amplifier to create a new instrument that, according to NMAH curator Charlie McGovern, "shaped the sound and direction of modern musical style, especially blues, rock and roll, country, and rhythm and blues."

From the Beatles to the Smashing Pumpkins, from Buddy Holly to Bonnie Raitt, from Charlie Christian to Eric Clapton, the electric guitar has sired a sound heard round the world.

Diane M. Bolz



Electric Hall of Fame: above, from left, the Rickenbacker Frying Pan, c. 1931; a Fender Precision Bass; 1954 Fender Stratocaster; a Gibson Flying V; 1937 Gibson ES150; 1936 Rickenbacker Electro Spanish; at left, 1959 Gibson Les Paul Standard.

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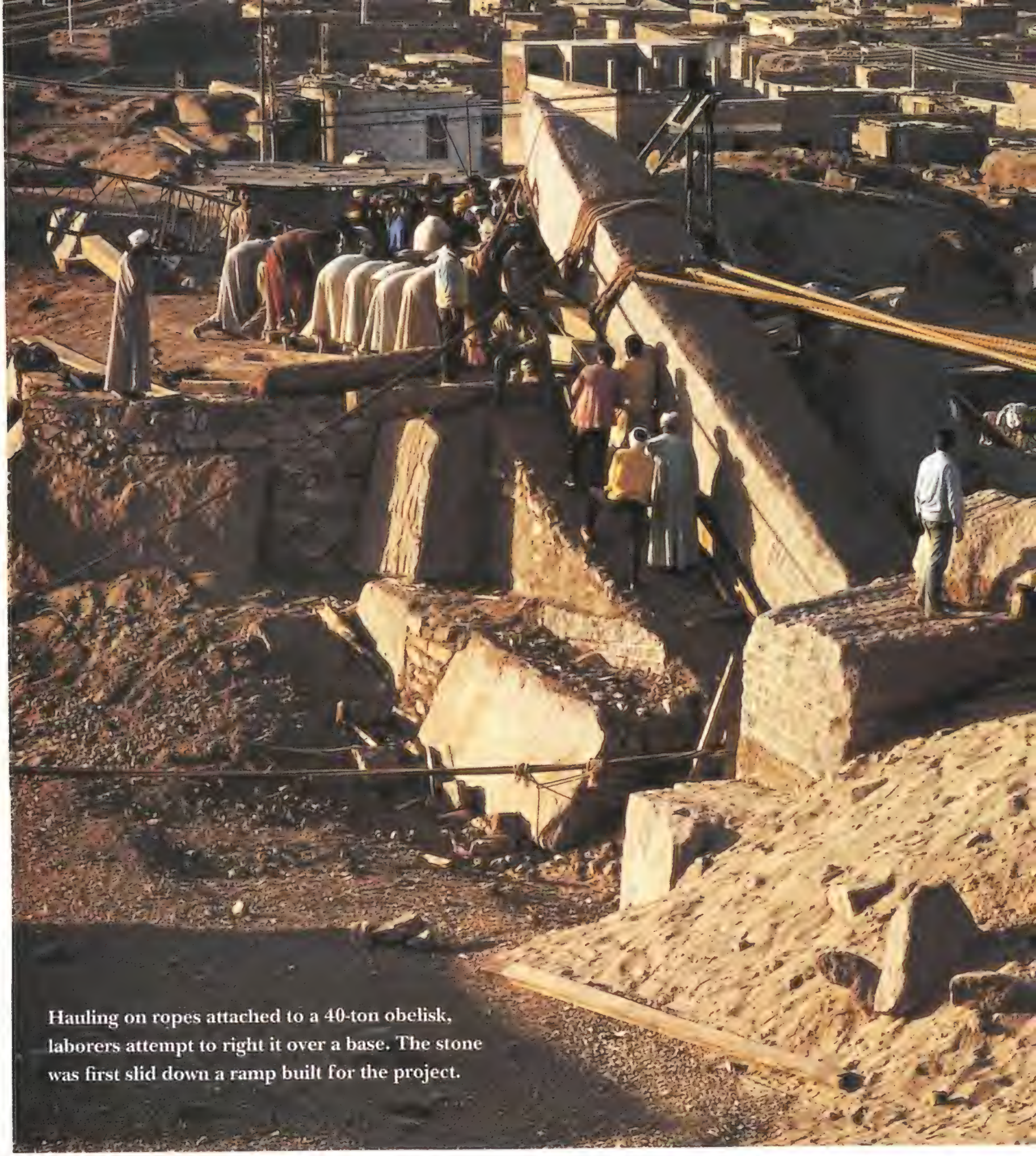


Hauling on ropes attached to a 40-ton obelisk, laborers attempt to right it over a base. The stone was first slid down a ramp built for the project.

By Evan Hadingham

A *Nova* crew strains, and chants, to solve the obelisk mystery

The public television team put theories to the test to uncover the secrets of how the ancient Eygptians moved and raised the giant blocks

The gaunt, majestic figure of the overseer, Ali el-Gasab, rises above a 40-ton block of granite in the ancient quarry at Aswan, 440 miles south of Cairo. For decades Gasab has supervised the re-erection of stone monuments for Egypt's Supreme Council of Antiquities, but today he faces his most severe test. As his gray cotton robes billow in the wind, he yells encouragement to some 200 laborers who chant, strain and sweat with the effort of hauling on ropes attached to the giant block.

A 92-foot wooden tower fitted with pulleys aided 900 men and 74 horses in erecting a stone in 1586.

The obelisk still stands in Vatican City today, where it is the centerpiece of St. Peter's Square.

This is the climax of an effort by a team from the public television program *Nova* to replicate the raising of an Egyptian obelisk—one of the most intriguing engineering feats of the ancient world. A classic obelisk is a giant four-sided pillar hewn from a single block of stone; it is the most distinctive symbol of Egyptian civilization besides the pyramid. Although an entire library could be filled with pyramid theories, the problem of the obelisks has mostly escaped attention. How *did* ancient Egyptian engineers carve the gigantic blocks, transport them across land and water, and finally raise them upright?

After days of toil, *Nova*'s team of laborers has managed to inch the 43-foot-long block up only a few degrees from the inclined ramp on which it rests. Despite his years of experience in stone moving, even Gasab is beginning to have doubts. Have they overlooked some vital, ingenious secret devised by the early Egyptian engineers?

Though no one in Egypt had previously dared to erect so large a block without modern machinery, the *Nova* stone was still only a fraction of the size of those routinely raised by the pharaohs' workers more than 3,000 years ago during the New Kingdom, 1550-1075 B.C.

For example, the magnificent obelisk still standing near the Great Temple of Amun-Re at Karnak, on the outskirts of Luxor, is nearly 100 feet high and weighs 323 tons—about equal to the weight of a Boeing 747-100 jumbo jet. Yet it is far from unique: over the course of the five centuries of the New Kingdom, dozens of massive obelisks were hewn from the quarries at Aswan, maneuvered to the banks of the Nile and then loaded onto boats. They were shipped north to adorn the sanctuaries of the gods—in the case of the Great Temple at Karnak, a distance of more than a hundred miles.

From the beginning, these obelisks' towering bulk, superbly polished surfaces and crisply carved hieroglyphs have excited wonder and envy. They were coveted by Roman emperors, popes, French monarchs, British diplomats and American Presidents, so that today only five remain standing in their original locations in Egypt. In every age, engineers faced extraordinary difficulties in applying the skills of their day to solving the problem of moving and erecting the giant stones.

In 1586, Pope Sixtus V commanded that an obelisk be the centerpiece of the newly laid-out St. Peter's Square in Rome. This involved moving a 340-ton obelisk 275 yards from where it had been set up by the Roman emperor Caligula some 15 centuries earlier. No record existed of the methods used by Caligula's laborers, so the pope set up a commission to draw on the talents of the best engineers of the day. A local architect, Domenico Fontana, won over the commissioners with an intricate scale model built around a two-foot-high obelisk of lead. To translate his model into reality, Fontana had to assemble a 92-foot-high wooden tower, about eight miles of three-inch-diameter rope, 48 capstans, wrought-iron pulleys, and 900 men and 74 horses (opposite).

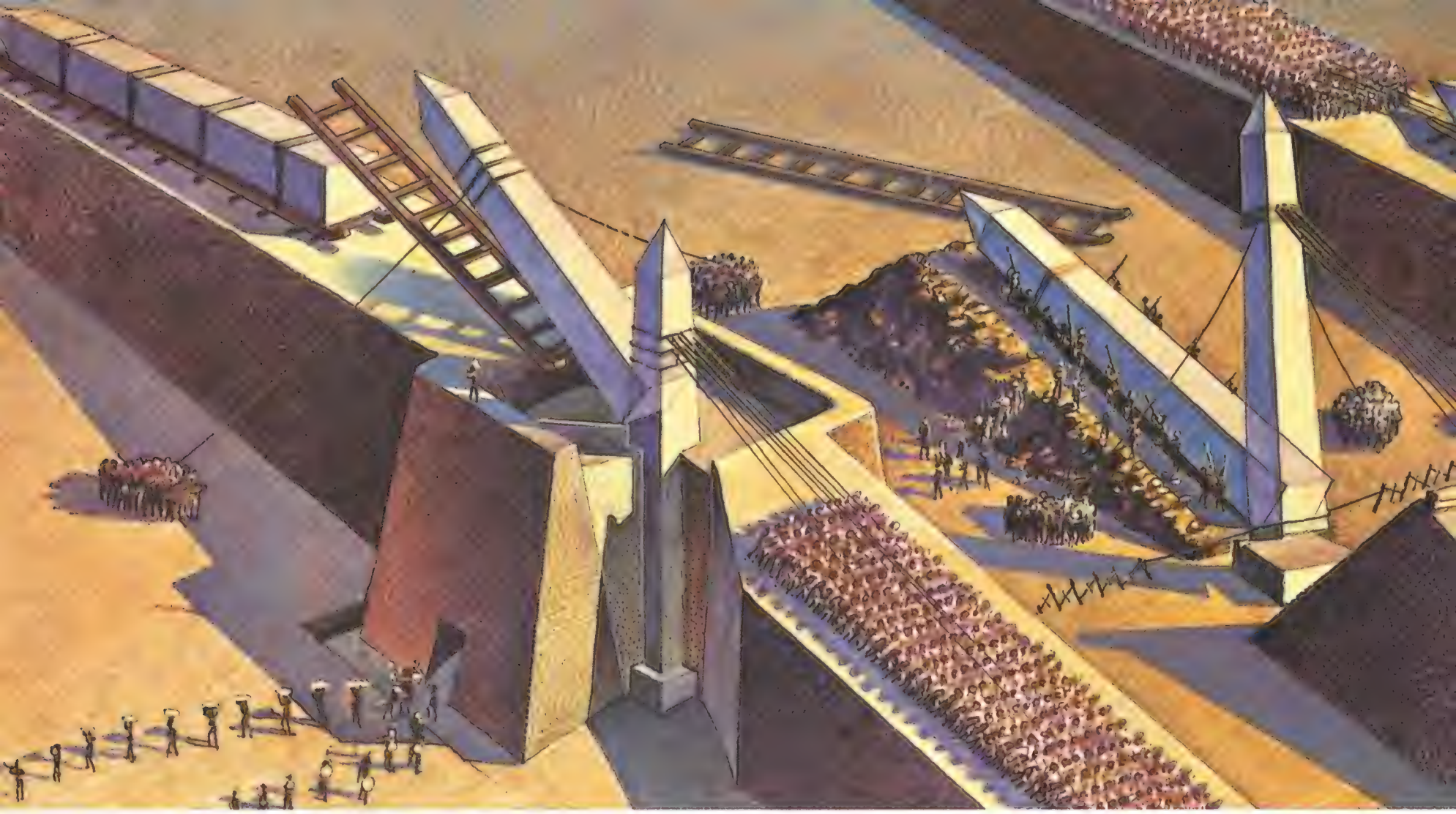
First, he had to lower the obelisk from its pedestal with ropes that ran around pulleys inside the wooden tower. From there the ropes fanned out in all directions across the square. Each end was fastened to a capstan turned by a team of laborers and horses. Coordinating their efforts called for split-second timing and dozens of supervisors. After an Ave Maria and a trumpet blast, the teams strained at their capstans, the wood groaned and the giant stone finally stirred, Fontana recalled, with a rumble like an earthquake. They moved the stone on rollers to the new site, then set up the tower again for the erection. It took 52 exhausting pulls and pushes, over the course of an entire day, to suspend the shaft vertically over its pedestal. On September 28, 1586, less than a year after Fontana had won the commission, the obelisk was formally consecrated by the pope.

A diplomatic gift no one thought we would claim

Even in the Industrial Age, raising an obelisk required great ingenuity. In 1879, U.S. Navy Lieut. Comdr. Henry Gorringe was charged with bringing a 220-ton obelisk, nicknamed Cleopatra's Needle, from Alexandria to New York. (Its twin, bearing the same nickname, had been moved to London in 1878.) Gorringe faced not only technical challenges but the stirring of Egyptian nationalism. The stone had been an official diplomatic gift to the United States, but as Gorringe later wrote, "There was a feeling in Egypt that the Americans would certainly require a century to perfect their arrangements . . . no one, not even the Khedive, believed that it would be removed." The unexpected arrival of Gorringe and his men in Alexandria provoked threats and jeers as they set about their arduous task.

Gorringe's ingenious plan involved an A-shaped steel frame that supported the obelisk close to its center of gravity (p. 32). The frame allowed the stone to be pivoted off its pedestal and swung to a horizontal position 43 feet above the ground. Then it was gradually lowered to earth with the aid of hydraulic jacks. Since the local merchants blocked Gorringe's plans to transport the stone to Alexandria's port directly through the city, he was forced to build a watertight wooden casing and float it for ten miles across the harbor. Launching this makeshift vessel into the choppy water gave Gorringe some anxious moments. Finally, the obelisk—now in dry dock—was rolled on cannonballs into the hold of the steamer *Dessoug*. Despite gales, the vessel laden with its massive cargo arrived in New York Harbor on July 19, 1880, one day ahead of schedule.

The author, a science journalist, has written several books on archaeology. He is co-executive producer of Discover Magazine *on the Discovery Channel.*



Theories on how the ancients raised obelisks were tested by *Nova*. At left, a stone is lowered into a chamber filled with sand as the sand is removed from below. Workers pack stones to wedge up an obelisk, center.

Perhaps the trickiest phase of all came next: rolling the stone along a specially built trackway from its landfall on the Hudson River, a mile and a half from its future site in Central Park. As the ten-week trek began, an *Evening Telegram* correspondent remarked, "The obelisk is giving some Americans a great deal more trouble than it gave the Egyptians." The climax came on a freezing afternoon on January 22, 1881. The same apparatus that was used to dismantle Cleopatra's Needle in Alexandria now had been reassembled in Central Park. Gorringe's workmen heaved on ropes as the obelisk was gingerly pivoted to an upright position. The spectators, "who crowded one another in the winter snow," noted *Harper's Weekly*, ". . . sent up cheer after cheer." The entire operation had taken 15 months.

The ancient Egyptians, of course, lacked Fontana's iron bolts and bars, concrete and capstans, not to mention the steam engines, hydraulic jacks and steel tower used by Gorringe. So how did they cope with the challenge?

While the ancient engineering evidence is tantalizingly incomplete, we have a clear idea of what obelisks meant to the Egyptians. The hieroglyphs carved deeply into them reveal that they were thought of as symbols of the almighty god Amun-Re, a deity that merged the older Egyptian god Amun with Re, their sun god. Indeed, the link between stones and sun worship may go back to the times of the earliest pharaohs, when pointed stones known as *ben* or *benben* served as fetishes of the primordial god Atum, the setting sun. Since the tops of many obelisks were originally clad in gold, copper or electrum, they would have shone like dazzling suns.

Obelisks were also potent symbols of imperial might. A pharaoh might erect them on the occasion of a royal jubilee or to boast of a victory, and would typically position them in pairs on either side of the entrance to a temple. At Karnak, one such obelisk is covered with inscriptions by Queen Hatshepsut, who ruled in the 15th century B.C., having proclaimed herself "pharaoh" after seizing power from a legitimate male heir. The hieroglyphs declare that she raised her obelisks for her "father," Amun-Re: "My heart directed me to make for him two obelisks of electrum, that their pinnacles might mingle with the sky," the inscription reads. "My Majesty began work on them in Year 15 . . . continuing until Year 16 . . . making 7 months in cutting [them] from the mountain."

Though the inscription refers to a mountain, the source for most large obelisks was a rambling boulder-strewn wilderness of ledges and gullies bordering the Nile's first cataract at Aswan. Here was the hard, durable, delicately mottled pink granite that was prized throughout the ancient world for statues, columns, pavements, bathtubs and sarcophagi.

Today, what are probably the world's oldest hardstone quarries are overlooked by a drab row of concrete apartments. Modern industry has invaded the ancient workings, and where the shouts of labor gangs once

At right, an obelisk is dragged up an incline, then eased down a ramp to its pedestal and pulled upright.

rang out, there is now a continuous roar of giant mechanical saws. Centuries after they were abandoned, the quarries were revived by a mechanical engineer, Hamada Rashwan, who came to Aswan as a young man more than 40 years ago. Rashwan figured out his own method of cutting and transporting the granite in massive sheets, which he now ships mainly to Germany for finishing into bathroom and kitchen countertops.

Most masons today quarry a block of granite simply by drilling holes into the bedrock and pounding in a row of metal wedges to detach the required block. This was not an option for the ancient Egyptians. They had tools of copper and bronze, but these would have been too soft for hammering into the granite. (Wedge marks *are* plentiful in the quarry, but they are clearly the product of iron tools, which were not common in Egypt until the sixth or seventh century B.C.) So, how was the massive bulk of a 300-ton obelisk won from the rock?

An answer to this stoneworking riddle lies in the Aswan quarry. A gigantic block known as the Unfinished Obelisk was abandoned in its final stages of construction among the granite ledges (p. 28). No ancient texts exist to tell us of the date or instigator of the project; in fact, the block was half-buried in sand until the Egyptologist Reginald Engelbach cleared away the site in 1922.

Engelbach's laborers uncovered two deep channels running along the sides of the obelisk, each about two and a half feet wide and nine feet deep. Hundreds of abandoned stone balls lay about the quarry. The balls, each weighing at least ten pounds, are of the tough rock dolerite and occur naturally in the surrounding desert. The technique appears to have been to bash the granite relentlessly with the stone balls (p. 30). Ancient quarrymen may have lashed them to wooden handles (since vanished) or else simply raised the heavy balls above their heads and brought them crashing down against the sides of the Unfinished Obelisk, doubtless to the accompaniment of rhythmic chants. In either case, vertical grooves roughly corresponding to the size of the balls are still visible along the sides of the obelisk—the lingering scars of an arduous operation.

Yet even this painful task was trivial compared with the final stage: driving a horizontal channel underneath the obelisk to detach the block. In the case of the Unfinished Obelisk, this daunting last step was never actually attempted, but there is evidence that other obelisks were undercut with this ball-pounding technique. Engelbach's methodical study indicated that had the Unfinished Obelisk been completed, it would have soared to a height of 137 feet and weighed around 1,170 tons. This would have made it perhaps the greatest single mass of stone ever quarried in the ancient world and a quantum leap over the largest successfully moved obelisk (a mere 455 tons). But as one researcher puts it, the attempt was clearly "asking more from Nature than Nature could deliver." After months of backbreaking work, the laborers laid down their tools and abandoned the project, doomed by the block's natural cracks and fissures.

Since there was no question of *Nova* devoting months of manual labor to bashing away at bedrock, the quarry operator, Rashwan, stepped in with modern machines. The plan was to carry out experiments with two different replica obelisks, one a manageable 2 tons and the other a massive 40. Even with mechanized equipment, cutting a single 40-ton block proved tricky; granite is a relatively brittle stone. Like the Unfinished Obelisk, the 40-ton block developed a crack, but luckily, this one did not prove fatal to the project.

Overcoming friction to move a colossal statue

Finally, with the aid of a crane, the block was lowered onto a massive wooden sled. Evidence for the use of sleds—in addition to remains of the vehicles themselves—comes from a 4,000-year-old Egyptian tomb painting that depicts the moving of a colossal seated statue. This statue, which was almost certainly heavier than the *Nova* block, is mounted on a sled pulled by 172 men; a man stands on the sled, pouring liquid in front of the runners as a lubricant. Researchers believe that the ancients used either lubricants or wooden rollers—or a combination of the two—to overcome friction and move their sleds forward.

An ancient 1,170-ton obelisk lies unfinished at the Aswan quarry; a crack rendered the stone unusable.

Even with such a sled and a trackway of rollers in place, *Nova*'s 40-ton obelisk at first refused to budge. Overcoming his dismay, the overseer Ali el-Gasab waved his arms and bellowed encouragement at the 200 or so laborers hauling on the ropes. Eventually, with the help of rhythmic chanting, their efforts became more coordinated. With all the men pulling together in concentrated bursts, the sled finally began to inch forward, and spirits soared.

Yet moving the stone was only the beginning. From the 16th to the 13th century B.C., massive obelisks were apparently lashed to the decks of giant barges and floated down the Nile from Aswan. A relief at Queen Hatshepsut's temple shows such a vessel towed by a fleet of smaller boats, with no fewer than *two* obelisks on board, laid end to end on top of the deck. How could the Egyptians have loaded a massive stone onto a barge without demolishing or at least capsizing the vessel?

One possibility is that they put the barge in the floodplain, buried it to the level of the deck, loaded the stone, then dug the vessel out and waited for the annual flooding of the Nile to carry it away. Unfortunately, it was impossible to test this theory. The modern Aswan High Dam has eliminated the annual Nile flood, and the boats available to the *Nova* team were unsuitable.

So the team decided to concentrate on the thorniest question of all—how the mighty stones were raised upright. Surprisingly, no details of this operation survive in any ancient Egyptian tomb painting, relief or hieroglyphic text. A few papyrus texts do offer obscure, indirect clues: one, for instance, posing mathematical problems, refers to massive embankments and a "magazine that has been loaded with sand" required for the erecting of a colossal monument. (The pupil is asked to calculate how many laborers it will take to empty the chamber of sand in six hours.)

A labor-saving miracle from Cecil B. DeMille

In the 1920s, Reginald Engelbach developed an obelisk theory based on the idea of a giant sand chamber. A high, funnel-like chamber is constructed around the pedestal and filled with sand. Laborers drag the obelisk up an immense sloping ramp to the top edge of the chamber. Meanwhile, another team is busy far below, digging out sand through a hatchway at the bottom of the chamber. As the sand is slowly removed, the obelisk gradually descends by itself into the chamber, eventually settling upright on its pedestal.

Engelbach's theory was immortalized by Hollywood. In a scene from Cecil B. DeMille's *The Ten Commandments*, Israelite slaves haul a gigantic obelisk on a ramp identical to a model illustrated by Engelbach. Suddenly, the ropes groan and give way, and the slaves collapse on the ground in confusion. The obelisk at first slides away disastrously out of control, heading down the chamber. Instead of shattering or jamming on its way down, however, it miraculously finds its way to its pedestal and snaps to attention, thereby saving the slaves days or weeks of backbreaking labor.

Even without such a special effects miracle, the sand chamber method seemed promising to Roger Hopkins, the Massachusetts stonemason on *Nova*'s team. Deciding to experiment with the smaller, 2-ton obelisk, Hopkins energetically supervised the building of a suitable ramp and chamber. All went well until the obelisk began its descent. The laborers at the base of the chamber soon found it impossible to remove the sand evenly; it did not flow with the smoothness of an hourglass. As a result, the obelisk began to sink down at a crooked angle. And since sand covered the obelisk's destination—its pedestal—it was difficult to correct the angle and aim the obelisk precisely on target. Any effort to do so meant laborers had to dig around the base of the stone in the soft, shifting sand, exposing them to danger.

After much trial and error, Hopkins succeeded, and the 2-ton stone stood proudly upright on its pedestal. But the sand chamber method inspired little enthusiasm among his colleagues. A Connecticut-based sculptor and passionate ancient technology buff, Martin Isler, pronounced it "crazy" to aim a stone blindly down

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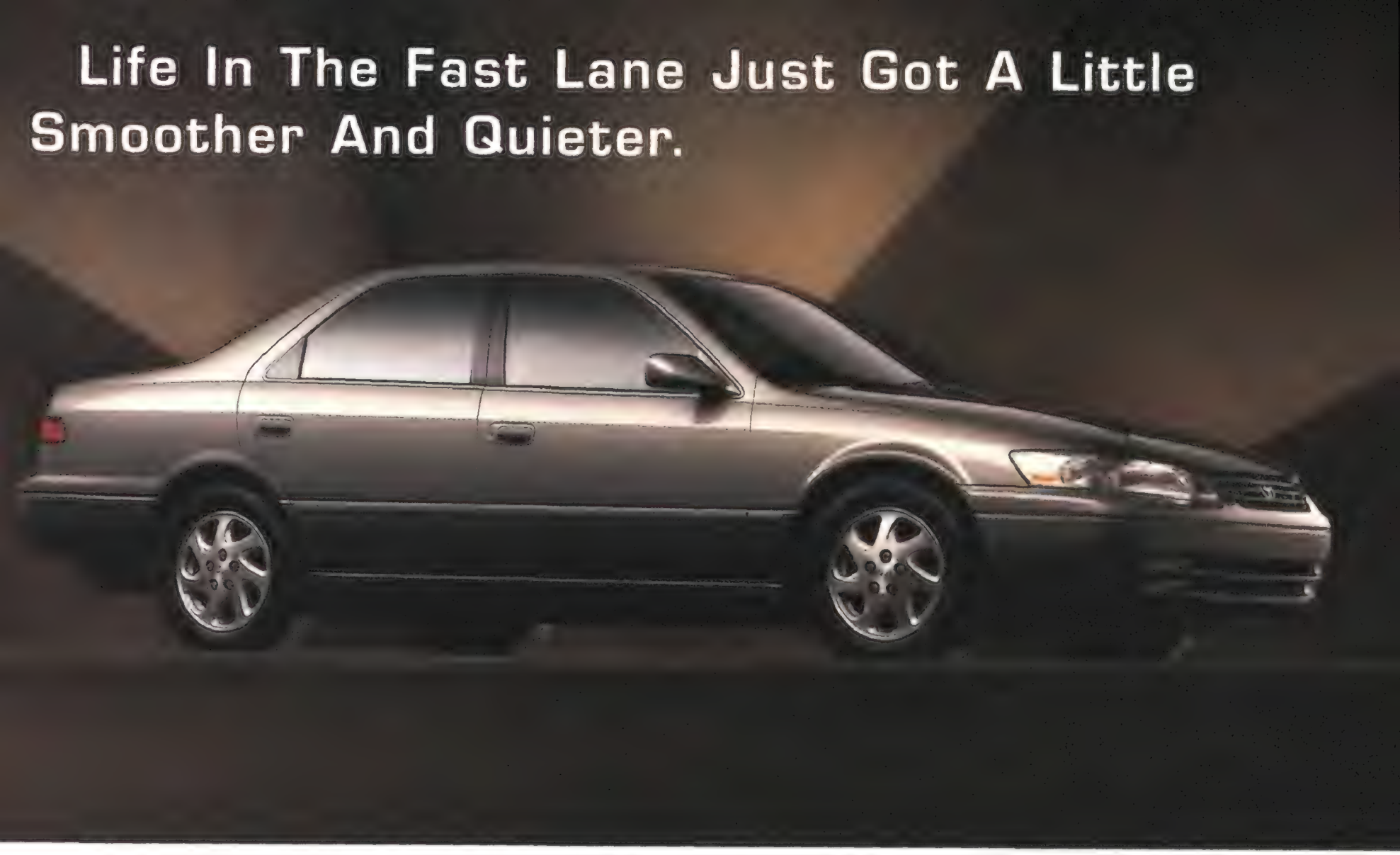

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a funnel of sand. He believes that a telltale clue found at almost every monument suggests a simpler approach. The clue consists of a shallow horizontal groove, about one foot wide and four inches deep, carved on the top of the pedestal.

According to Isler, this so-called turning groove is an essential key to the obelisk-raising mystery. The position and size of each groove suggests that an obelisk may have rested there and been pivoted upward, like a giant hinge. In Isler's scenario, the laborers drag the obelisk to the edge of the pedestal until its lower edge catches in the groove. Then they gradually "hinge" the stone to an upright position. They do this by inching the stone off the ground with levers and then slipping packing material—earth and stone rubble—underneath. Eventually, when the stone reaches a high enough angle, laborers can pull it upright with ropes.

Following this method, Isler's team easily succeeded in raising the 2-ton obelisk in a matter of hours. Yet there were doubts. While it might work perfectly for an obelisk of 2 tons, how could an obelisk of 300 or 400 tons be hinged upward to a vertical position? The higher the top of the obelisk was raised off the ground, the harder it would be to use levers effectively, while the supporting platform would grow to colossal proportions.

These drawbacks are illustrated by Thor Heyerdahl's account of his adventures on Easter Island in 1955. Heyerdahl dared the mayor to re-erect one of the island's famous giant statues, weighing between 25 and 30 tons. The mayor's men used a combination of ropes, levers and packing stones quite similar to Isler's method. The trickiest moment came as the pile of rubble grew to 12 feet in height. "The mayor," wrote Heyerdahl, "was extremely careful, checking the position of every stone: the weight of the colossus was so great that some of the stones cracked under the pressure like lumps of sugar. A single careless placing could mean catastrophe." Fortunately, on the 18th day, thanks to skillful manipulation of the ropes, the islanders managed to pull the statue off its supporting platform of rubble and into an upright position without incident.

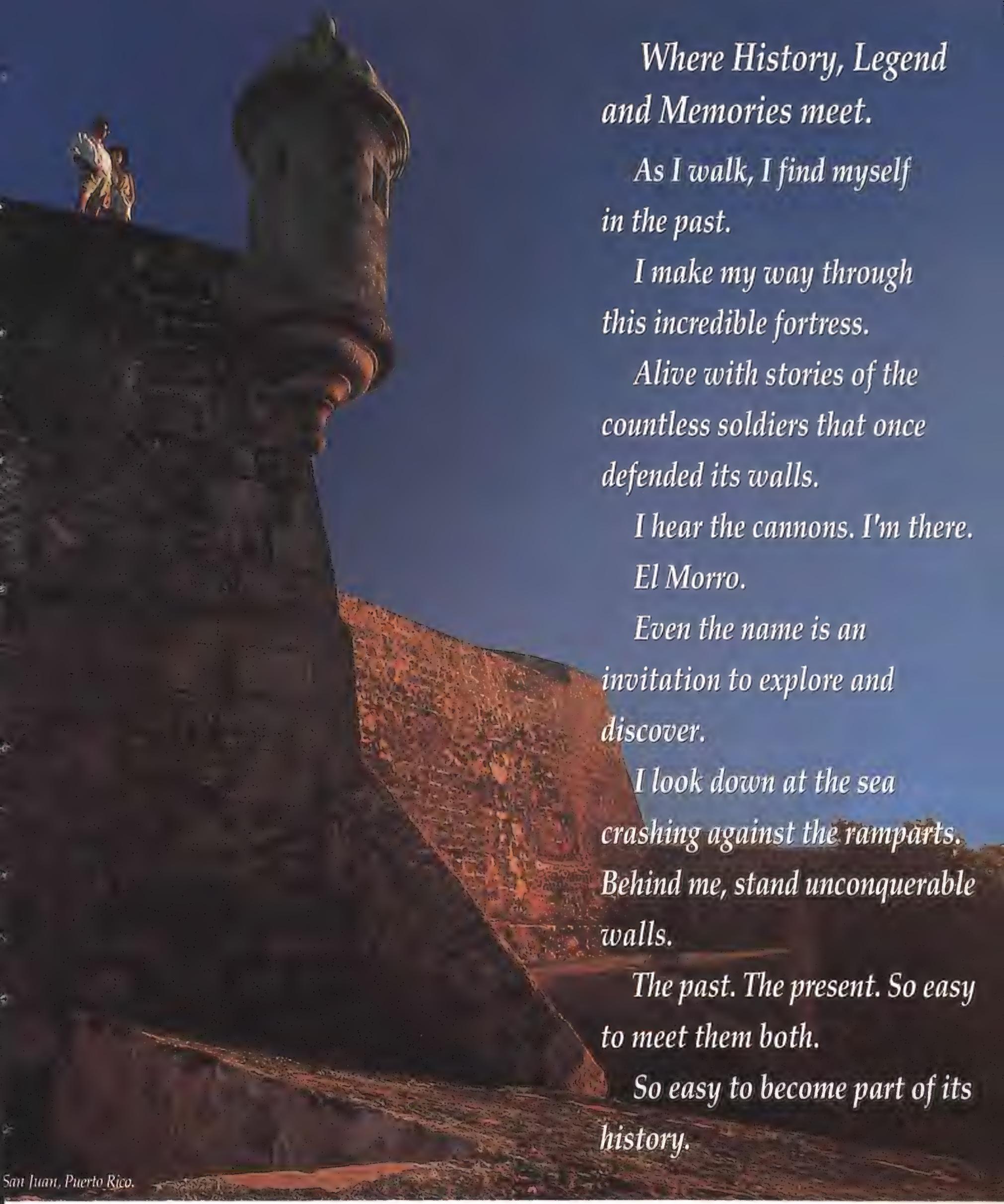
The lesson of Heyerdahl's story is clear: the bigger the stone, the more difficult and dangerous it would be to rely simply on levers, ropes and unstable packing material to raise it off the ground. But what, then, was the secret of the obelisk builders' success?

With only a few days of project time left to raise *Nova*'s 40-ton obelisk, tensions rose among the team members as they debated the problem. Finally, Gasab came up with a creative solution. Instead of struggling to lever the stone all the way up from ground level, why not build a ramp that sloped down to the pedestal? The obelisk (strapped to its sled) would be eased gently down the ramp until it came to rest in the turning groove; then the laborers would cut away the sled and begin raising the stone with levers, ropes and packing material as before. The sloping ramp had the obvious advantage of saving work; it meant starting off with the stone already raised at an angle, and with a solid support beneath it.

How do you control a teetering obelisk?

By now, the team had come to expect every promising theory to be fraught with difficulty. In this case, the laborers already knew how to haul the 40-ton obelisk on level ground. But how would they control it as it teetered over the edge of a sloping ramp? What would prevent it from running away and smashing on the pedestal below? Egyptologist Mark Lehner (SMITHSONIAN, April 1986) pictured the consequences: "[It] wouldn't be a total tragedy for us, but imagine if this was Hatshepsut's obelisk, that had taken seven months to quarry. Consider all the elbow grease, the blood, sweat and tears spent adorning it with hieroglyphics and polishing it so that it would reflect the sun. If that finished obelisk was at this pivot point, and crashed down and smashed into pieces, it would have been a tragedy indeed."

Egyptologist Mark Lehner pounds granite with a dolorite stone to test a possible quarrying technique.



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Cleopatra's Needle was pivoted off its pedestal in Alexandria (above) and moved in a casing by ship for display in New York's Central Park (opposite).

For *Nova*'s team, the moment of truth soon arrived: 200 chanting laborers hauled the stone to the edge of the ramp, where its bottom half hung alarmingly over empty space below. To prevent the runaway disaster imagined by Lehner, Gasab had devised simple "brakes": restraining ropes wound around logs jammed between stone anchors. For a moment the team's efforts lay poised in a tug-of-war between opposing forces. Then, with a heart-stopping shudder, the stone tipped forward and lurched down the slope. The restraining ropes groaned and the brakes tried to pop out of their anchors. But the ropes held fast, and slowly the obelisk began its controlled descent down the ramp. With a final grinding crunch, the sled came to a stop, tilted on the edge of the pedestal. When the stone was released, its bottom edge slid right into the turning groove. The quarry echoed with cheers and singing as Gasab was hoisted high on the shoulders of elated workers.

The celebration turned out to be premature. The stone was now lying on the sloping ramp at an angle of 33 degrees: there was a long way to go before it stood upright. So the laborers began Isler's technique of levering up the stone and packing rubble underneath. At first the work went well: in a single day they managed to raise the stone to a 40-degree pitch. But then, as the angle of the stone grew steeper, and the supporting rubble less stable, it became harder and harder to use levers. The pace slowed down: the next day, it took six hours to raise the top a mere two inches. Valiantly, the men on the ropes hauled and struggled, but in the end 200 men could not exert enough force to lift the stone any higher. Discouragement set in. Out of time and money, the *Nova* team reluctantly abandoned the obelisk where it still lies today, on the quarry ramp.

In the end, the team's work was frustrated by a shortage of two elements the ancient Egyptians had in abundance: time and manpower. Given a workforce of 2,000 rather than 200, Gasab was convinced his method would have worked. The combination of a sloping ramp and enough men would surely succeed. "But you just can't do this to a deadline," he commented, shaking his head ruefully beside the abandoned stone. The story of their efforts, part of a *Nova* miniseries, will air on public television on February 12.

Despite the experiment's failure, it had proved an important point. The ancient Egyptians may have had only rudimentary tools and mechanical aids, but they took on engineering problems of daunting complexity. "I think this is what the ancient technology comes down to," Mark Lehner commented. "Men like Ali with their skill, and the enthusiasm of their men, were probably the most important ingredients in ancient technology." As the near success of Ali el-Gasab's experiment suggested, it is in such human factors that the obelisk raisers' secret ultimately lay.

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North America
YELLOWSTONE ELK

By Richard Wolkomir

Following the footsteps of fox and bear

Naturalist-sleuth Susan Morse and her fellow conservationists at Keeping Track monitor wildlife in order to pinpoint critical habitat

Trekking her home territory, Morse relies on a hiking staff and a pack to hold data-recording equipment.

Susan Morse leads her four pack-bearing German shepherds up a slushy Vermont mountainside. We straggle behind in the rain, 12 neophytes on a quest. We have come to learn the rudiments of animal tracking, from a nationally known expert. "Here's a tight, sweet little track," Morse announces, leaning on the hiking staff she cut from a sapling. We crowd around. In the sodden April snow, we see shapeless indentations. We don't have a clue.

"Well, is it the dog family or the cat family?" Morse prompts. It looks like the blob family. But Morse urges us to kneel, nose to print, for a close-up inspection. I begin to make out the four hollows pressed into the snow by the animal's toes, a claw's indentation, the chevron-shaped heel pad.

As the only one here who had a previous session with Morse, I feel on the spot. I finally remember what she said about heel pads: the feline heel's forward edge is indented ("So it looks like the cat's two little ears sticking up"). The canine heel's forward edge comes to a single point ("Like a wolf's pointed nose").

"Dog family?" I venture. "Now Richard will tell us which species it is," Morse announces, grinning. I stare at the track numbly. No wolves live here in the Green Mountains; I know that. "Golden retriever?" A wild guess. "Instead of looking at one print, look at the whole track sequence—what can you tell from studying the *pattern*?" Morse asks.

It looks like dots across the snow. But Morse points out that the tracks are single file, a dainty line. "So that's a fox," she says. Foxes are so narrow-bodied, she explains, that they can generally place one foot almost directly in front of the other. Somebody asks, red fox or gray? Morse points out that the heel pad's indentation is a little blurred. That is because the pad was furred over. "Red fox, then," she says. Gray foxes have "naked" (hairless) heels. "This was probably Reynard," Morse tells us, starting back up the mountain.

She has been monitoring animals in this stretch of the Green Mountains so long she knows some as individuals, and has given them names. But her tracking is serious, and the 12 of us following her today are not here for fun. Morse is the executive director of Keeping Track, a nonprofit organization that teaches tracking to community groups from New Hampshire to California.

Morse's Vermont cabin reveals a researcher-detective's tools: study molds of tracks and an extensive library.

Photographs by Richard Howard and Susan Morse

While Morse looks on, Keeping Track trainee Debra Kraemer hugs a tree to try to re-create the action that left teeth marks behind on this trunk. Visualizing the event often helps to identify the creature that made the sign or mark, in this case, a black bear.

In another visualization exercise (opposite), a tracking novice from the same Thetford, Vermont, group tries to simulate the gait of an animal by following its tracks. The rolling waddle that she enacts offers a reliable clue: the pattern is in fact typical of the raccoon.

These volunteers then use tracking to generate data on habitat use, which local planning boards, conservation organizations and governments can use in trying to preserve critical habitats. "If you have, for instance, a North woods beech forest that turns out to be essential to bears, maybe the town can direct proposed development to some other site," observes Morse.

I have come along with a group from Montpelier, the Vermont capital. They are starting a Keeping Track program to study a swath of woods and farmland, gathering data for town planning and conservation commissioners. I'm all for it. I've lived nearby for years, and it's been painful watching straitened farmers sell off their pastures, which then sprout neo-Colonials with minivans parked out front on macadam driveways. I hope some land can be saved for muskrats and moose.

This is the group's first of six training sessions. After they are proficient trackers, they will set up "transects," paths crossing wetlands, hardwood stands of maple, birch and beech, boreal forests of fir and spruce, and farmland reverting to woodland. Once each season, volunteers will patrol the transects.

They will note signs left by the five animals Keeping Track has selected as key local species for Vermont—black bear, fisher, river otter, mink and bobcat. "These species," says Morse, "are particularly vulnerable to habitat loss because they require relatively large home ranges and have low population densities and reproductive rates." They serve as indicators of the health of their wild habitat. When these key species wane, it is a warning that habitat is fragmenting. "Protecting habitat for these species ensures that habitat will be protected for other species, too," says Morse.

But to save habitat, we must learn to track. And so we continue sloshing up this mountainside logging trail in a spring rain, following Morse, with her blonde blunt-cut hair and her phalanx of German shepherds. The dogs wear search-and-rescue packs stocked with emergency gear, in case a ridgetop misstep sends one of us tumbling headlong.

"Look at this," Morse says, pointing at a log upon which some creature has deposited a long, twisted dropping. She whips out tweezers and a lens and peers intently at the scat. "There's a good quill in here," she announces, as gleeful as an archaeologist finding pharaonic gold. "Who eats porcupines?" she asks, and answers herself: "Fisher!" So one of the weasel's large cousins passed here. "Maybe it's Mr. Softie!" Morse says.

A few years ago she received an orphaned fisher kit to raise. To keep the fisher wild, she set up a lonely cage in the woods. Food was no problem. "I gave him cat food," she says, "and he loved grapes."

Keeping aloof was hard. "Only on the last day did I take his picture—unbelievable self-restraint!" says Morse, an accomplished wildlife photographer. Bringing his food, she took to making a high-pitched squeak. Her idea was for the fisher to associate the squeak with food, so that after she freed him, if he seemed in trouble, she could put out food and signal him. It was to be a "soft release," the freed fisher's guardian angel secretly watching over him. And so she named him Mr. Softie.

Several times during Mr. Softie's first wild winter he took advantage of Morse's summoning squeak to find food she had cached in trees. She also made snowshoe trails for him. Two years ago, a bitter winter, Mr. Softie's tracks vanished. But in the spring they reappeared. Jubilant, Morse tracked her protégé all day, finally coming to a tree with a small, high hole. Littering the snow below were scraps of flying squirrel hide. She tapped the tree with her hiking staff. High up, a head poked out: Mr. Softie. He looked down at her, yawned, and then went back inside. He had, clearly, mastered being a wild fisher. "He found squirrels in there and ate them and then took a nap in their nest," Morse says.

Pocketing her magnifying glass, she returns the fisher scat to the ecosystem. She gives us its lesson, "Morse's 23rd Rule": tracks are only one clue in identification. Droppings are important. So are bitten-off grass blades, snagged hairs, marked trees and overturned stones.

"Most people think tracking is looking at the ground, but maybe 50 percent is not on the ground; it's other stories being told," Morse explains. And a few minutes down the trail we practice that precept. Morse leans on her hiking staff, gazing at a boulder the size of a hassock. She waits for us to notice whatever she is noticing.

On our knees, we peer at the rock like jewelers evaluating the mother of all uncut diamonds. Faint scratches! And bare spots where the moss was torn off. "I've found it's instructive to *become* the animal," Morse tells us.

One trainee gingerly puts her hands on scratch marks where the animal's left and right paws must have gone. She pretends to strain and move the boulder, although it is too heavy. Instantly, we all see it was a bear.

"The story behind this is last summer's drought," Morse says, beaming at what has become her honors class. "Everything dried up, and the bears didn't have much in the way of berries and other foods, so they went after colonial insects, like the ants and beetles that probably lived under this rock."

I had telephoned Morse after reading a newspaper

Richard Wolkomir reports that since writing this story, he has gotten into the habit of walking head down, scanning for clues in dust or in snow.

story about Keeping Track, and she invited me to visit. She lives a half-hour from Vermont's largest city, Burlington, where developments slowly spread across the meadows like weeds. To get to her house, I drove along a maze of byways and old cow paths, then past a horse farm onto a bumpy dirt road through pastures and spruce jungles, and finally—with the Green Mountains' western flank rising ahead—onto a rutted lane under maples that dead-ended at Morse's cabin.

"I just got back from setting up a Keeping Track program in San Diego, and it's taken me three days to decompress from the population density," she says.

She grew up outside of Philadelphia, where she was a kind of "wild child." She spent hours prowling forests along Wissahickon Creek, and on her grandfather's 2,000-acre farm in the Pennsylvania countryside. Her family had been landscapers for generations.

Her cabin's walls are lined with books, both literature and natural history, interspersed with her vivid photographs of cougars, lynx and bobcats. On display in one corner are molds of animal tracks and sets of rubber reproductions of animal feet.

Since childhood, a love for the wild

Her fascination with wild things began before she was old enough to remember. As a child, she shoveled snow and chopped wood to earn money to travel in the Western deserts with friends of her family. Recognizing the girl's passionate interests, her naturalist grandfather gave her rock specimens for Christmas and encouraged her love for wild animals and their habitats. Another family friend got her started tracking.

She majored in forestry at Pennsylvania State University. But there seemed to be, at that time, little connection between the discipline's dry underpinnings—calculus, statistics and chemistry—and exploring and saving the habitat she loved. And so she drifted into the university's literary life, probably the only student forester publishing poems in journals.

After her sophomore year, Morse transferred to the University of Vermont, where she majored in English. She liked Thoreau, Frost and Faulkner. "But by my senior year I had fallen head over heels in love with Shakespeare," she says. In graduate school it was Shakespeare she studied. But she never left the outdoors, and ultimately, the outdoors, as a career choice, won out over literature. Partly it was because, just after moving to Vermont in 1969, Morse had a tracking epiphany.

One dead-of-winter dawn, she hiked along a ridge above her house. Snow melted in a January thaw had refrozen, with a dusting of star-like snow crystals. She found the tracks of a bobcat. She seemed to actually "see" the cat, where it crouched behind a spruce, then advanced and crouched again.

Whether you live in the city, near the woods, or at a canyon's edge, you may find tracks in your backyard.

She came to the tracks of a snowshoe hare nibbling twigs beside an old logging skid road. She saw the bobcat's final crouch behind a stand of spruce. She saw where its paws kneaded the snow. Then came the spring. She found hare fur on the snow, and drops of blood. "And then the track of the kitty dragging the hare off," she says. She found the spot where the bobcat ate the hare, leaving only fur and churned snow and part of the colon, feet and skull. Deciphering tracks turned out to be like interpreting a literary passage. Morse decided to become Thoreauvian, a self-directed biospheric scholar. Tracks would be her text.

In the 1980s, she telephoned Harley Shaw, then an

This chart offers a guide for identifying prints from coyote to cottontail and representative trail patterns.

Arizona Game and Fish Department biologist known nationally for his cougar research. He agreed to teach her cougar tracking and to record tracks along transects. "It's low-tech because we don't do radio tracking or spotting from airplanes," Shaw tells me when I telephone. "I felt we needed ways to monitor these animals less intrusively, with less time and cost." With tracking, he says, "you can establish presence for the animal, and over time you can monitor population trends."

Morse joined Shaw and an expanding cadre of volunteers, from as far off as Germany, to survey cougar spoor along transects at Fort Huachuca, a sprawling Army base in southern Arizona. "It began as a joint project between the fort and the Arizona Game and Fish Department, but after I retired we kept at it," Shaw recalls. Fort Huachuca became Keeping Track's model, and Shaw applauds Morse's expansion of the work and seeding of groups nationwide. It needs to be done, he says, because funds for biological fieldwork are dwindling. "I think well-trained volunteers will be increasingly important—the alternative is no information at all."

Cougars in southern Arizona exemplify an animal needing Keeping Track's kind of help. They live on "sky islands," forested mountains thrust up from the desert. To maintain genetic diversity, Shaw explains, a species needs at least 500 breeding animals, and 500 cougars need about 10,000 square miles. "But that's only if the habitat is perfect," he says. "In the real world, it's more like these big cats need 30,000 square miles."

Morse has pondered this issue, too. "Corridors between those sky islands are essential," she says, "and if the valleys fill up with houses and highways, cutting off the cougars' routes between the mountains, they'll be gone." Morse now codirects the Fort Huachuca project on a volunteer basis and makes an annual pilgrimage there to train new volunteers and track big cats. She is also a consultant. Recently, for instance, she determined that a particular tract of Vermont mountainside did indeed serve as critical bear habitat. But since 1994, when she and fellow conservationists founded Keeping Track, most of her time has been devoted to training community volunteers.

Surviving in the freeway's shadow

When I first visited her, she had just returned from San Diego, called in by the Friends of Los Penasquitos Canyon Preserve. Houses line the 3,500-acre wildlife preserve's rim. Freeways roar overhead. Yet, the canyon is home to more than 175 species of birds, 500 species of plants, and even cougars and bobcats.

"We already had trackers among our members," says Mike Kelly, the organization's president. "But we flew Sue Morse out to help us get on a more scientific footing, like how do we design good transects?" Morse also decided the volunteers needed more skills identifying scat and other nontrack signs. And now, in the wake of her visit, the group has laid out transects and picked key animals—coyote, long-tailed weasel, gray fox, badger, mule deer, cougar and bobcat. Bobcats in San Diego may sound surprising, but Morse found their tracks even under the dozen-plus freeway lanes where Interstates 5 and 805 merge.

In Vermont, following Morse up the mountain in the rain, we find no sign of bobcat. But, as she predicted, tracks are just part of the story. We find, for instance, a tree with two parallel gouges, like the numeral 11. A moose, Morse observes, has dug its lower incisors into

the bark and raked them upward, exposing inner bark in order, she theorizes, to ingest minerals found there.

We stop at a huge 200-year-old "witness tree," a hemlock preserved to mark a farm's boundaries. It is also a "baby-sitter tree," up which generations of mother bears have shooed cubs so the mothers could forage unencumbered. Morse shows us the cubs' scratch marks.

Under a hemlock sapling we find the snow strewn with small branches, nipped off by a browsing porcupine. Next door is a girdled beech. Morse announces: "There's a little story here." Gnawing its way around the beech, the porcupine reached the spot where the two trees grew close together. Enterprisingly, to get at every bit of the tasty beech bark, it wedged itself between the two trees. Morse shows us quill pricks in the hemlock.

We pass a five-story cliff she has dubbed the Bobcat Brownstones, where the cats hide from enemies, such as coyotes. We go on bobcat-track alert. Above a beaver pond, Morse abruptly points at a patch of mud. We see nothing, until a woman shouts, "Oh my God, you're right!" Now we see a perfect imprint, rounded, the four teardrop-shaped toes in an asymmetrical arc, the heel pad's leading edge with a characteristic indentation.

Topping another ridge, we find a mystery track. It amazes us: at this height, a web-footed water-loving otter. But Morse says otters think nothing of climbing mountains like this to reach the next valley's wetland.

Our next stumper is a wild cherry tree with broken-off branches piled at its base. But there's an overt clue: one bear hair, snagged at the end of a jagged branch. "Hungry bear climbs to the top and gets so far out on a skinny branch that it breaks," Morse says. "The bear falls, snapping off limbs all the way down until it crashes on top of its pile of broken branches." Black bears are relentless in preparation for hibernation; adult bears may gain as much as 1½ pounds a day. This massive weight gain may require eating 25,000 calories a day for several months.

Hiking back down the mountain, Morse points out a final sign, broken-off branches stored, four stories up, in a towering beech. It is a "bear's nest": a bear has broken off branches laden with beechnuts and piled them in a crotch, convenient for munching.

So far, I think, we have learned how much we don't know. Standing beside my car before driving home, I ask Morse what it takes to become a tracker. "Dirt time," she answers. Tracking guidebooks help, she adds, but they can be confusing. Tracks change with the animal's gait and how hard it presses down its foot, splaying the toes. Tracks look different on crusty snow, soft snow, deep snow, slushy snow or snow-dusted ice, and in soft ground, dust, wet mud, drying mud, sand, wet sand. Tracks change with age; and tracks made in the open sun may not resemble tracks made in a cedar's shade.

I listen to all this glumly. Tracking turns out to be no snap course. Besides, my own urge to track comes mostly from books—probably my first encounter was Robinson Crusoe, discovering that footprint in the sand. But what really fired me up as a kid was Sherlock Holmes. In *The Hound of the Baskervilles,* for instance, Holmes must ponder the unfortunate Sir Charles Baskerville's footprints down his yew-lined walk, en route to his mysterious death. And, as the attending physician told Holmes, the walk had other tracks, too. Dr. Mortimer looked strangely at Holmes and his friend, Watson. His voice

Precision is essential to data collection: at left, a volunteer, demonstrating raking action, takes dimensions of a bear scrape; above, black bear hairs caught on a pole are demarcated.

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sank to a whisper: "'Mr. Holmes, they were the footprints of a giant hound!'"

What got me to actually try tracking was the *Scout Field Book*. It described exploits of Scouting's founder, the British officer Sir Robert Baden-Powell. Standing in the African sand, he began speculating about tracks he identified as women's, heading toward the hills where an enemy encampment was thought to be located. What knocked me out was what he and his companion, a Zulu tracker, learned from a leaf they found about ten yards off the treeless track. Baden-Powell knew that the species grew in a village 15 miles back. The leaf was damp and smelled of the local beer, so he deduced the women were carrying the brew in leaf-stoppered pots. He knew they had passed in the early morning, before 5 A.M., when the winds had stopped. No leaf could have been blown off the track after that. And he deduced what time the men hidden in the hills would have received the beer, and that they would now be too muddled to notice him reconnoitering.

Stalking the wild Barbary ram

One leaf! I scoured my neighborhood for such telltale signs, but got discouraged. Luckily, I had not then read the memoirs of another Britisher, Sir Alfred Pease, a Kenyan big-game hunter who introduced Teddy Roosevelt to the thrill of tracking big cats and gunning them down. Pease praised Algerian trackers who had guided him to a wild Barbary ram by noticing a bush with one nibbled-off twig tip. But the most amazing tracker was a man called Ibrahim. Pease saw Ibrahim touch hoofprints in the desert sand with his big toe and pronounce whether the gazelle had passed a half-hour ago, or four hours ago, by whether the print had collected nighttime dew that crusted in the sun.

My toe will never match the IQ of Ibrahim's. But when Susan Morse invites me back to test my new skills, such as they are, I am gung ho. She has scheduled a "business trip" with one of Keeping Track's directors, Judy Bond, a professional natural resources mapper.

Bond will use a handheld satellite link (the Global Positioning System or GPS) to accurately line out a transect through a six-square-mile section of mountains Morse is studying. It is part of a 185-square-mile stretch—much of it wild—along the Green Mountains' northwestern flank. Morse's habitat studies have already convinced one town to preserve a wetlands corridor here. But she hopes Keeping Track's data will persuade the state and local governments to encourage private landowners to protect and preserve their holdings.

Meanwhile, today's hike will give Bond practice lining out transects using the GPS satellites. Her goal is to perfect the technique so that Keeping Track groups can present planning commissions with more precise habitat maps. Our last hike was in rain and mist. Today, sunlight sharpens everything, and blobs of snow melting from hemlock branches plop onto our heads. We have not gone far under this slaphappy bombardment when we "cut" our first track, which I get right: coyote. So far, my grade is an A.

We find another coyote track, and Morse asks me to say when it was made. But I have no idea. "It was between 8 and 10, last night," she says. "You can see it crossed this puddle of muddy water and left a wet track that froze. It got down to 28 degrees last night, but warmed up this morning, so the track froze before morning. And it has a light dusting of snow. It snowed heavily last night, but tapered off after 8 P.M., so the coyote must have walked by around then."

I miss the tiny tooth marks left in a tree by a squirrel after sap. A waddling raccoon track stumps me. My grade sinks even lower when I miss the claw marks left by a fisher climbing for berries. At the next clawed tree, I announce, "Fisher!" But it was a porcupine.

I won't be a dropout. Tracking is teaching me that landscapes where nothing seems to be going on are full of business, if you learn to read the memos and reports written in the mud. I plan to keep at it. In fact, as we hike, Morse keeping us on the transect, Bond tapping her satellite-link keys, and me desperately seeking tracks to get my grade up, I finger a talisman I put in my jacket pocket. It is a photocopy of Henry David Thoreau's journal entry for January 30, 1841, a tracker's credo.

"Here is the distinct trail of a fox stretching a quarter of a mile across the pond," Thoreau wrote. "I know which way a mind wended this morning, what horizon it faced, by the setting of these tracks; whether it moved slowly or rapidly, by the greater or less intervals . . . for the swiftest step leaves yet a lasting trace."

Member of weasel family, the fisher has rebounded in northern New England. Opposite: Morse says tracks are those of Mr. Softie, a fisher she released to the wild.

By Stanley Meisler

Ahead of the curve: the art of Charles Rennie Mackintosh

With his wife, Margaret, he changed the face of Glasgow; now the city is celebrating them by sending a major exhibition across the pond

Charles Rennie Mackintosh, the masterful Scottish architect and designer, created his small stock of exquisite work in a brief outburst of youthful exuberance around the turn of the century and then slipped into a desperate decline. After Mackintosh died in 1928, a critic described him as "the European counterpart of Frank Lloyd Wright" and a forerunner of Le Corbusier. In 1994, a Mackintosh writing desk was sold at auction in London for an astounding £793,500, setting a record for a piece of 20th-century furniture. But Mackintosh never felt the kind of acclaim during his lifetime that critics shower on great artists. After tasting early success in his native Glasgow, a depressed Mackintosh found himself falling out of fashion. Drinking too much, he muttered bitterly in his 40s about the world passing him by. Long before he died, he gave up architecture and design.

Even now, his work is not as well known as it deserves to be. Critics have never agreed where to place him. Some describe Mackintosh as a prophet of modernism; some call him an apostle of Art Nouveau. But, in fact, Mackintosh approached every building, every room, as if he were composing a different poem, using his imagination to create something special and whole.

The difficulty about placing him in a school of architecture or design probably contributes to a confused image of Mackintosh. He also left very few writings to clarify his intentions and feelings. The confusion is compounded in the United States by distance. While American textbooks always find space for him, Mackintosh is a remote figure here. There are few pieces of his furniture in American museums and no examples of his architecture in the United States. Glasgow, the home of his wondrous buildings, is not on the usual itinerary for Americans on their grand tours of Europe.

This lack of familiarity is bound to end soon because of a major artistic happening—the first retrospective of the work of Mackintosh to reach the United States. Organized by the Glasgow Museums, the Hunterian Art Gallery of the University of Glasgow and the Glasgow School of Art, and mounted first at the McLellan Galleries in Glasgow, the exhibition arrived at the Metropolitan Museum of Art in New York in November, where it will remain until February 16. It will then go to the Art Institute of Chicago (March 29-June 22) and the Los Angeles County Museum of Art (August 3-October 12). So much energy and love has been expended on the exhibition from both sides of the Atlantic that J. Stewart Johnson of the Metropolitan, cocurator of the exhibition and a lifelong Mackintosh aficionado, joked to reporters at the opening in Glasgow, "Mackintosh is not a household name in the States yet. But he will be or I'll commit suicide."

Charles Rennie Mackintosh was born in Glasgow on June 7, 1868, the son of a burly policeman who captained the city's world-champion police tug-of-war team. Glasgow was then a teeming industrial town, "the second city of the empire," the most populous city in Scotland. Glasgow's wealthy industrialists prided themselves on their sponsorship of new architecture, their taste in design and their interest in cultural trends emanating from the European continent rather than London.

One of the Ingram Street tearooms, from 1900, has been re-created for the traveling show, now at the Met.

Regarded as Mackintosh's masterpiece, the Glasgow School of Art (here, the north facade) is a subtle study of bold, straight lines played against curves.

Mackintosh grew up in a Glasgow tenement neighborhood but not a hellish one. Young Charles was born with a lame foot, developed a drooping eyelid and probably suffered from dyslexia, but he was a determined student with a penchant for drawing and a desire to make a name in architecture. He apprenticed himself to an architect at the age of 16 and was hired by a prestigious architectural firm, Honeyman and Keppie, as a draftsman five years later.

Herbert McNair, another young draftsman at the firm, and Mackintosh took night classes in art and design at the Glasgow School of Art—a proper step for young architects intent on advancement in their firms—and soon became attached to a circle of young women students who liked to call themselves "the Immortals." The most talented were the Macdonald sisters, whose watercolors and designs and posters featured thin, ethereal female figures that struck local critics as weird and spooky. Mackintosh would marry Margaret Macdonald a few years later, while McNair married her younger sister, Frances, and the four often exhibited their furniture and interior designs and watercolors together.

Architectural offices were bastions of bourgeois gentility, but Mackintosh could assume a bohemian air while cavorting with the Immortals. Photographs show a strikingly handsome young man picnicking with McNair and the women and sporting a dark mustache, a loose shirt and an overflowing artist's cravat. Despite his limp and droop, he was popular and talkative. His friends called him "Toshie."

In 1890, he won a prize of £60 for three months' travel in Italy. His tour diary revealed an unpretentious 22-year-old who was excited to find "the originals of many old and well-known friends" when he entered the Uffizi Gallery in Florence. The monumental works of Italy did not shake his conviction that a Scottish architect must remain rooted to traditional Scottish architecture.

Margaret Macdonald, tall and freckled, with copper red hair, would have an enormous influence on Mackintosh's work. "She opened up to him a new intellectual world in which the artist is a self-conscious person," says Daniel Robbins, curator of British Art and Design for the Glasgow Museums and the project coordinator of the exhibition in Glasgow. Her influence was so great that foolish critics would sometimes dismiss the curvaceous, symbolic side to Mackintosh's work as nothing more than ruinous wifely interference.

In fact, Macdonald's contributions were vital. Mackintosh's art depended on creating a balance between forces like darkness and light, line and curve, abstraction and sensuality, function and symbol. His wife did not just add decoration to his work but helped him fashion the forces creating the tension. She and Toshie signed many works jointly, but her hand can often be seen even in furniture and buildings attributed solely to

"Toshie" (top, at age 25) and Margaret (bottom) were lifelong collaborators. She created the large panel *The May Queen* in the Ingram Street tearoom of 1900.

Charles Rennie Mackintosh. "Margaret has genius," Mackintosh once told a friend. "I have only talent."

His glory days as an architect did not last very long. All his buildings were constructed in the Glasgow area during a brief frenetic period from 1893, when he was 25 years old, to 1909, when he was 41. The output includes the Glasgow Herald building, the Glasgow School of Art, the Queen's Cross Church, the Scotland Street School, the Hill House and a few other structures.

It is not easy to discern the influences upon Mackintosh. He agreed with those in the British Arts and Crafts Movement who preached the need of craftsmanship to break the monotony of the mass-produced objects coming out of the factories of the Industrial Revolution. He also accepted the pleas of those Scottish architects who urged their colleagues to scour the traditional buildings of the Scottish countryside for inspiration. But, far from mimicking the work of others, he infused his creations with extraordinary inventiveness, subtlety and wit. "The artist cannot attain to mastery in his art," he once said in a lecture, "unless he is endowed in the highest degree with the faculty of invention." Mackintosh was certainly endowed with it. "I have found Mackintosh to be a lonely figure who drew so heavily on his own formal imagination," wrote British critic Alan Crawford recently, "that much of what was going on around him was irrelevant."

Numerous critics talk about the wit and playfulness in Mackintosh's work. The Scotland Street School, for example, has two circular towers embedded in the facade, one housing the entrance for boys, the other for girls. These resemble the thick-walled towers on old Scottish castles that enclose spiral staircases in darkness. The towers of the school, however, are almost all window, and when you enter the building, you find that they do not enclose any spiral staircases at all. Straight and ordinary staircases are recessed far back into the building. The towers have no other function than to enclose a void and shower it with light. The trick makes you smile, but the overall mood is exhilarating.

The bold use of glass-dominated towers at this elementary school is surely one reason that some critics hailed Mackintosh later as a pioneer of modern architecture. Yet it is hard to fit the towers into the creed of modern architecture that "form follows function." They came out of the imagination of Mackintosh and not out of any use in the building. In fact, school officials were troubled by his disregard for practical matters in his design. They complained bitterly, for example, about the way he divided each window into many little panes. They were too hard to keep clean.

Mackintosh's masterpiece is surely the new Glasgow

School of Art building that he designed in 1896. Much of its greatness comes from subtlety, and Glasgow at first failed to realize the value of the treasure that graced a full block of Renfrew Street high on one of the city's downtown hills. They did not treat the building as a wealth of creativity but as "thoroughly business-like," "suitable for the requirements of art education" and "primarily utilitarian." They were right in a sense. The building has certainly proven suitable; it has been used for almost a hundred years by generations of Glasgow art students who have sat in Mackintosh's high-backed chairs, studied under the hanging, geometric lamps of his library and rushed past the colored-tile designs embedded in the stairwell walls.

Yet the Glasgow School of Art is as spectacular as it is suitable. An onlooker standing across the street, howev-

In March 1995 Stanley Meisler wrote on Russia's Hermitage Museum and its exhibition of a cache of masterpieces kept hidden since World War II.

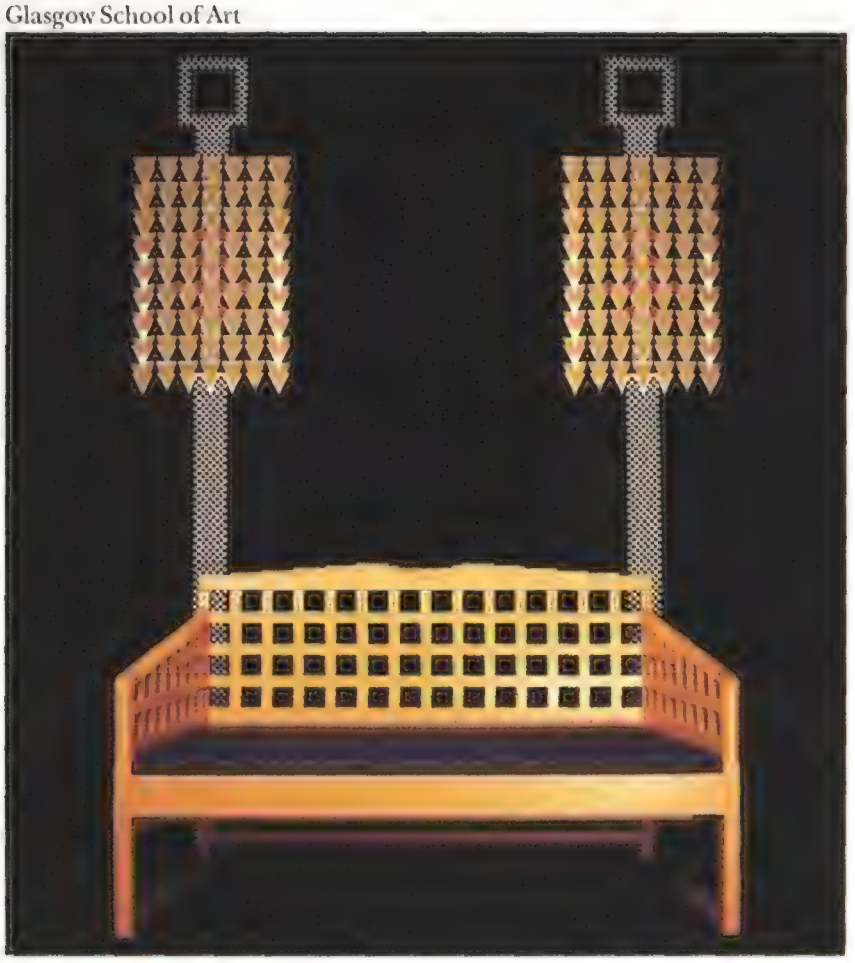
In creating the Hill House (left), which echoed 300-year-old Crathes Castle, Mackintosh designed crucial details, from windowpanes to wall stencils (above).

er, needs time to discern the excitement and inventiveness emerging from its subtle beauty. The building is a continual discovery. Pamela Robertson, the curator of the Mackintosh collection at the University of Glasgow and the cocurator of the current exhibition, says that she and other critics did not realize until recently that Mackintosh had used more than a hundred different designs for the school's windows and panes. This was discovered only when craftsmen prepared the scale model for the exhibition.

The front of the buff masonry school at first might even seem classical and symmetrical to a casual onlooker. But it soon becomes obvious that there is no symmetry, for there are three sets of windows on one half of the facade and four sets on the other. Curves dominate the center of the facade with a frieze of two ethereal women clutching a rosebud—straight out of Margaret Macdonald's work—above the entrance door. The final impression is a lovely tension between decorative curve and asymmetrical rectangle.

During the heyday of his architectural work, Mackintosh received numerous contracts to design interiors. In the case of the Hill House (above), the country home of Glasgow publisher Walter Blackie, Mackintosh designed the building, the interior decoration and much of the furniture. Although individual elements of his design can still startle with their inventiveness (decorative hinges that do not hold anything in place; high ladder-back chairs tempered by subtle curves; stencils of slight, pink roses upon a sea of solid white wood), Mackintosh conceived of each room and, to some extent, the whole interior of a building as a total work of art. His pieces of

Glasgow School of Art



Created for a Glasgow tearoom, this wooden settee fronted a dark wall painted with vertical designs.

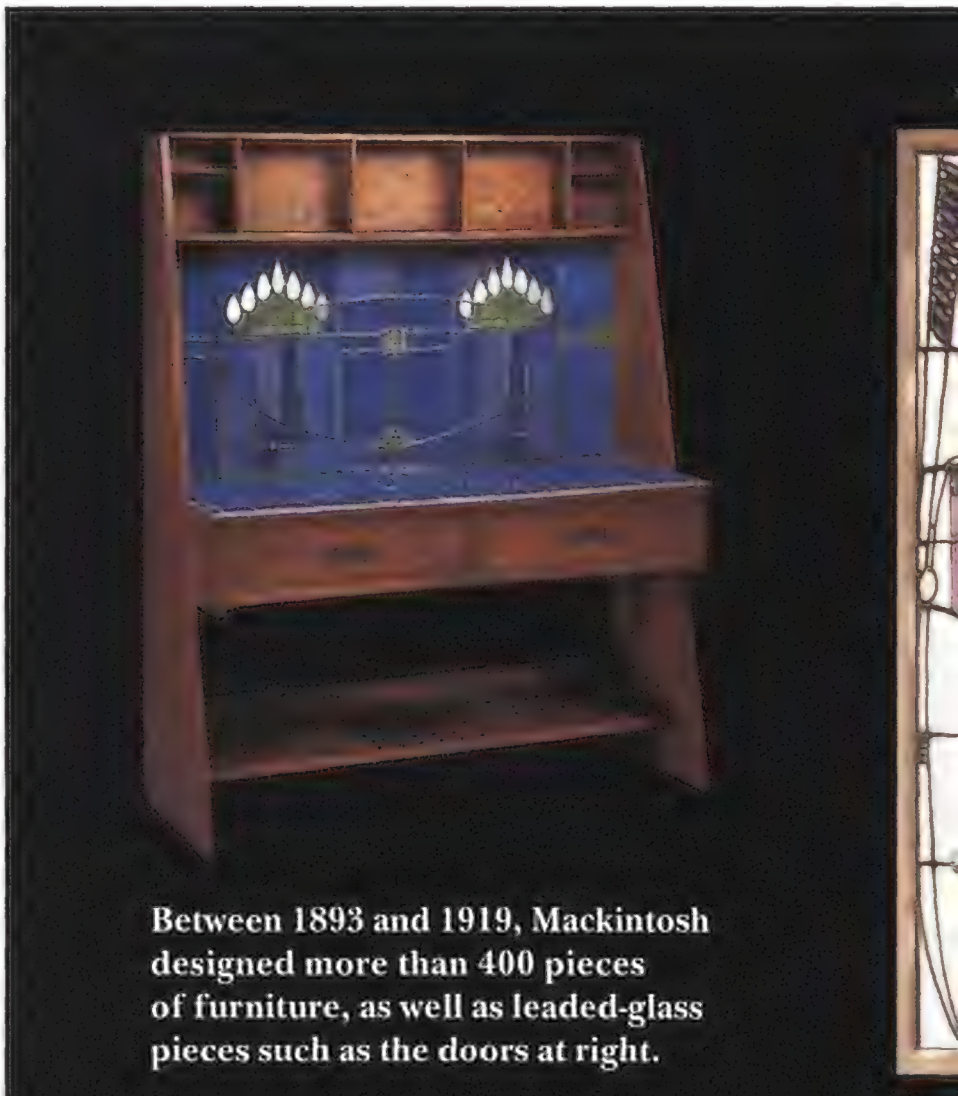
furniture do not show their full beauty until placed in the exact spot for which he designed them.

With Macdonald's help, Mackintosh designed the interiors of their own homes, the Hill House, various other private dwellings, the famous tearooms of Glasgow businesswoman Kate Cranston, a room that they showed in the Vienna Secession exhibition of 1900 and rooms for other international art shows. Harmony and contrast ruled their work. The Hill House, where dark staircases and hallways contrasted with dazzling white rooms, can send critics into raptures. In the catalog accompanying the current exhibition, John McKean of the University of Brighton calls the Hill House "an essay in chamber music" and exclaims "it is difficult to keep hold of the range of orchestrated sounds that together build into the experience of these interior places."

The Glasgow public saw the work of Mackintosh mostly in the popular tearooms of Kate Cranston. Encouraged by both the temperance movement of the late 19th century and the growing middle-class desire to dine comfortably and respectably in public, tearooms became popular in England and Scotland during the Mackintosh era. They offered light, nonalcoholic meals at small tables in a variety of different rooms in pleasant surroundings. Industrious and independent, Cranston wore funny hats and out-of-date dresses but wanted her tearooms fitted in the latest fashion. For almost 20 years, she paid Mackintosh to decorate the interiors of the various rooms of her complexes on Buchanan, Argyle, Ingram and Sauchiehall streets.

The Glasgow Museums have managed to restore and exhibit the walls, leaded-glass panels, fittings and furniture of the Ladies Luncheon Room of Cranston's establishment on Ingram Street, which had been dismantled in 1971. Mackintosh designed the silver-white room on two levels and broke its rectilinear mood with two dramatic murals facing each other, one by himself, the other, called *The May Queen* (pp. 44-45), by Margaret Macdonald. Rooms like these had an impact. "It is very amusing—and in spite of all the efforts to stamp out the Mackintosh influence," Macdonald wrote to the German critic Hermann Muthesius in 1904, "the whole town is getting covered with imitations of Mackintosh tearooms, Mackintosh shops, Mackintosh furniture, . . . it is too funny—I wonder how it will end." It did not end well.

Before World War I, Mackintosh received a good deal of attention from architectural and design circles on the Continent, especially in Germany and Austria. Muthesius, a critic who had been attached to the German Embassy in London for several years, wrote a long article in 1902 for the German magazine *Dekorative Kunst* (Decorative Art) extolling the work of both Mackintosh and Macdonald. Muthesius insisted that his two Scottish friends were the only ones in Great Britain who understood that "it is the room as a whole with which serious art should be concerned." Their display at the Vienna exhibition in 1900 impressed many of the leading lights of the Secessionist movement.



Between 1893 and 1919, Mackintosh designed more than 400 pieces of furniture, as well as leaded-glass pieces such as the doors at right.

Work was so plentiful in Glasgow early in the century that the Mackintoshes felt stuck there. "We both wish that we could go & live somewhere in the south of England," Macdonald wrote in a letter in 1903, "but the bread-and-butter being here, we cannot." The bread and butter, however, soon ran out.

The final wing of the Glasgow School of Art, completed in 1909, was Mackintosh's last major architectural contract. Kate Cranston, who would give up her tearooms and retire by 1920, had very little work for Mackintosh after 1911. He entered several competitions after that time but won only a few minor contracts. Despite his reputation abroad, he was becoming outmoded in Glasgow. Customers lost interest in the individualistic Mackintosh free style and took up the latest fashion, classical architecture, with its straight and symmetrical facades. Some trendy Glasgow architects turned to new materials and built tall buildings of steel and glass like those going up in America.

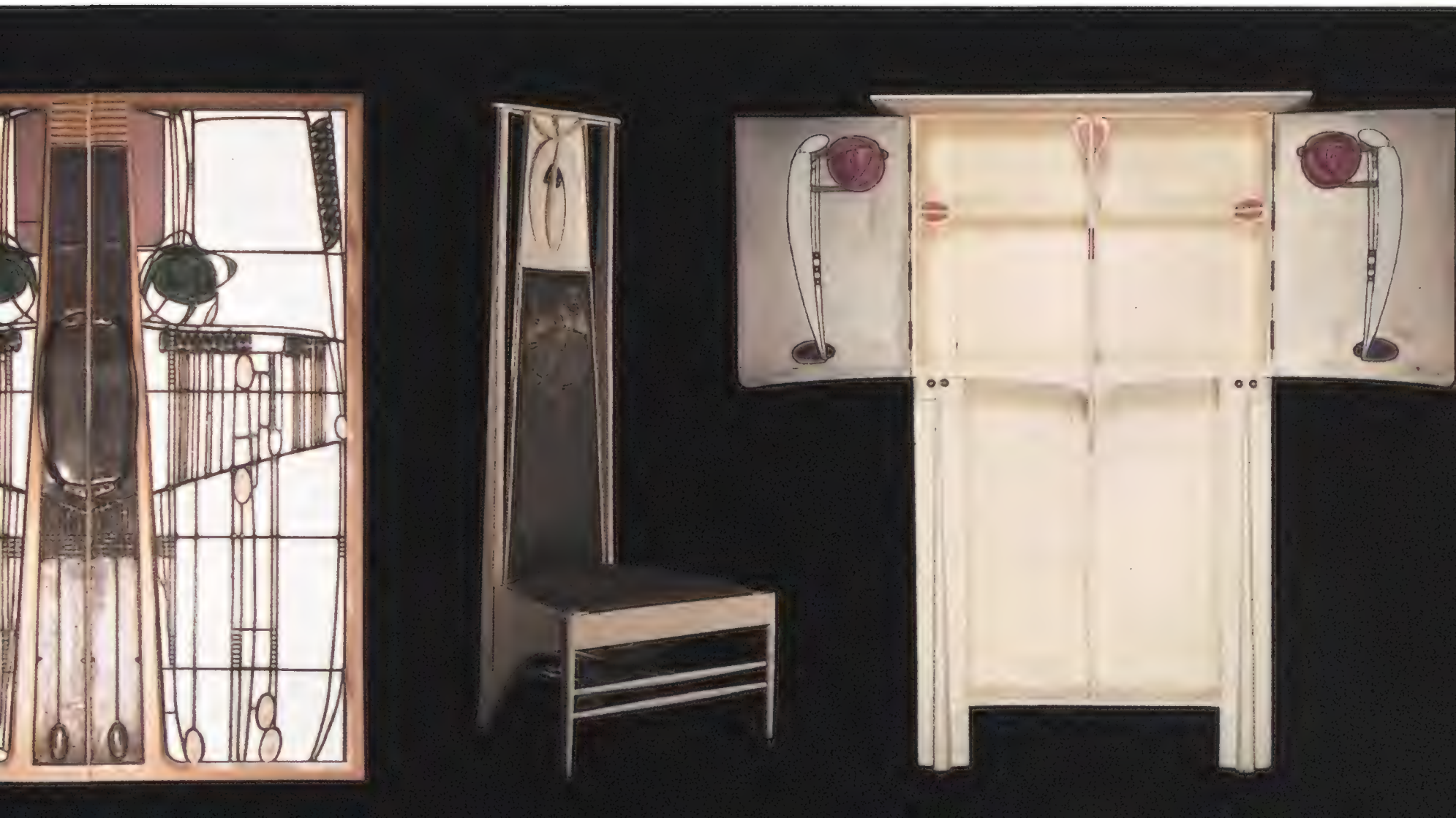
Even though some of his friends were adapting to the latest fashion, Mackintosh would not. Nor did the new materials interest him. "These two comparatively modern materials iron & glass, though eminently suitable for many purposes," he had written in 1892, "will never worthily take the place of stone."

Mackintosh's relations with his architect partner, John Keppie, worsened. There had been a problem for a long while, in any case, because Keppie's sister, Jessie, a classmate of the Macdonald sisters, felt she had been jilted by Mackintosh in favor of Margaret in 1896. The firm found business slackening, and Mackintosh seemed to lose interest in the practice. He sometimes disappeared at lunchtime for more than three hours.

Mackintosh's drinking began to attract attention (he spent more time in the local pub than at the construction site on one job), and he angered Keppie by failing to finish plans in time to submit them for a contest. In 1913, Mackintosh quit the partnership and set up shop on his own but found practically no work.

Portraits of Mackintosh at age 45 and 46 show a pudgy man with a puffy face looking more like a tired clerk than an artist. All the youthful exuberance in the photographs taken when he was cavorting with the Immortals has disappeared. His old friend Walter Blackie called on him. "I found Mackintosh sitting at his desk, evidently in a deeply depressed frame of mind," Blackie wrote years later. "To my enquiry as to how he was keeping and what he was doing he made no response. But presently he began to talk slowly and dolefully. He said how hard he found it to receive no general recognition; only a very few saw merit in his work and the many passed him by."

In July 1914, the Mackintoshes finally did get to England, departing on vacation for Walberswick, a fishing village in Suffolk known as a resort for artists. World War I erupted in a few weeks, and they decided to stay for a while. "I induced Toshie to just stop on & get the real rest cure that he has so badly needed for quite two years," Macdonald wrote a friend. They did not realize it, but they had turned their backs on Glasgow.



Mackintosh whiled away his time in Walberswick making careful drawings of flowers in pencil and watercolor. In a few months, his wife wrote her friend that "already Toshie is quite a different being and evidently at the end of the year will be quite fit again." But the idyll was interrupted by neighbors who found it suspicious for a Scotsman to have so many friends in enemy countries during wartime. Military authorities searched their house, found letters from Germany and Austria, and ordered them to leave the coastal village so close to the Continent. The Mackintoshes departed for London, settling among artists in Chelsea.

Chelsea was a chance to start anew. Mackintosh was, after all, only 47. But he received few contracts. W. J. Bassett-Lowke, a manufacturer of engineering models, asked him to renovate a house in Northhampton in time for his impending marriage. Mackintosh also designed a new basement for one of Kate Cranston's tearooms. A procession of artists asked him to design studio buildings for them in Chelsea, yet for one reason or another, all these projects but one were abandoned before construction.

The couple supported themselves in Chelsea by designing patterns for textiles and bookbindings, and collecting rent from the tenant of their house in Glasgow. Mackintosh resumed drawing flowers again. "I find myself at the moment very hard up," he wrote to an old patron in 1919, "and I was wondering if you could see your way to buy one of my flower pictures or landscapes for £20 or £30. . . . I shall be glad to hear from you this week as my rent of £16 is overdue and I must pay or leave." He had failed to restore his career, and after eight years, the Mackintoshes moved to the South of France.

From 1923 onward, they lived in various French towns near the Pyrenees, favoring Port Vendres, a Mediterranean town not far from the Spanish border. "I am struggling to paint in watercolour—soon I shall paint in oils," Mackintosh wrote to his old friend Francis Newbery, the director of the Glasgow School of Art. Mackintosh devoted the rest of his life to landscapes, mostly in watercolor, mostly of rocks and lifeless buildings.

In a 1924 survey of modern English architecture, a *Times* of London critic cited the work of Mackintosh, stating that "it is hardly too much to say that the whole modernist movement in European architecture derives from him." But that recognition came too late to bring Mackintosh back to architecture. A lifelong smoker, he developed cancer of the tongue three years later and, after radium treatment in London, lost the power of speech. Mackintosh died in a nursing home in London in 1928 at the age of 60. Margaret Macdonald died four years later. The value of her belongings, including 26 watercolors, five oils and a few pieces of furniture, all by Mackintosh, was assessed at a little under £89.

The fame for which Mackintosh had longed came soon afterward. Glasgow continued to ignore Mackintosh's work, but numerous critics hailed him as a master of modern, functional architecture. To do so, they had to dismiss the decorative side of his work, usually blaming it on Macdonald. After World War II, there was a worldwide renewal of interest in the curvaceous, flowery decoration that flourished as Art Nouveau at the turn of the century, and Mackintosh was suddenly hailed as a master of Art Nouveau. More recent critics now realize that he fits neither niche easily and is probably best regarded as an isolated genius with a fiercely independent imagination.

Glasgow could not continue ignoring so well known a native son. On the centenary of his birth in 1968, Mackintosh was honored by a special exhibition, held not in Glasgow but in Edinburgh. Perhaps the shock of a rival Scottish city taking over the celebration of a Glaswegian woke Glasgow. Two organizations, the Friends of Toshie and the Charles Rennie Mackintosh Society, began to drum up local enthusiasm. The city rediscovered Mackintosh. Glasgow soon brimmed with Mackintosh coffee mugs, Mackintosh T-shirts, Mackintosh jewelry, Mackintosh scarves, copies of Mackintosh furniture and Mackintosh posters. A wag called the ubiquitous giftware "Mockintosh."

In a kind of historical irony, the impetus for mounting a retrospective in 1996—the 100th anniversary of the submission of Mackintosh's plans for building the Glasgow School of Art—came from Glasgow. Curators had an easy time persuading local officials that sending a Mackintosh exhibition across the United States was a surefire way these days of promoting the city. Toshie, ignored by his hometown for so many years, would have the last laugh.

Late in life, his career languishing, Mackintosh painted sumptuous still lifes; here, *Anemones*, from about 1916.

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Feathered flights of fancy

No ordinary fowl, these birds have been bred for visual delight. For many an owner, they are just too pretty to eat

The barnyard objets d'art on these pages and the cover are treasured breeds, many of them centuries old, that are raised by hobbyists here and in Europe. Descended from the same jungle fowl as their supermarket brethren, these are now bred mainly for show (although a few owners enjoy the best of both worlds).

Chickens were first domesticated about 5,000 years ago in India, apparently as much for the production of fighting cocks as for meat and eggs. They were in Egypt by 1400 B.C. and in the British Isles by the time the Romans arrived.

The origins of the show breeds are less well known. The Cochins (such as the two at right), for example, notable for their feathered legs and the puffy bustles on their backs, came to England from Shanghai in 1845. The crested Polish dates back to at least 1600.

Chickens in the supermarket no longer belong to any recognizable breed. They are hybrids, bred for meat or egg production. It is the hobbyists who have kept the old commercial breeds—the Rhode Island Reds, the Plymouth Rocks, the leghorns—alive. And it is they who perpetuate the ornamental breeds for little more than show ribbons, modest cash prizes and the proceeds from selling breeding stock.

John P. Wiley jr.

Photographs by Eric Sander

This creature was carefully bred to look like *Sesame Street*'s Big Bird. Joe Stromei crossed a white Polish rooster with a buff Araucana frizzle hen. She lays blue eggs. The term "frizzle" means the feathers curl up.

This couple are white-crested blue Polish bantams. The crests sprout from a large protuberance on the skull. You tell the sex by the feathers. The ends of the female's are round while the male's come to a point.

Another Polish cranes its neck as it walks away from the camera, making the most of its crest. This one is said to be "laced": most of its feathers are outlined in a contrasting color. The lacing here is uneven, however.

The lacing on this hen's body feathers is far more pronounced than that of the bird on the previous page. This Polish looks different because she is crouching and leaning back to look up.

These bantam hens are silkies, named for their Angora-like plumage. An old breed mentioned by Marco Polo, they have deep purple, nearly black skin. The line is believed to be native to China or Japan.

A blue red Dutch bantam rooster eyes a couple of chicks (they have chipmunk-like stripes down their backs). This bird is believed to have a color pattern similar to the jungle fowl from which today's chickens were bred.

It's true, t
does tend

he engine to race a bit.

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Always wear your seat belt.

By Robert Wernick

He huffed and he puffed—*et voila! un château redux*

Richard Hurbain is no Bourbon, but with pail, shovel and plenty of true grit, he rescued an old castle from rack, ruin and red tape

No one in Richard Hurbain's wide circle of friends in the bustling Parisian suburb of Montfermeil could understand why he was not the happiest man in the world. He was young, vigorous, incurably optimistic, a good worker who had made his way up at the electric company from climbing poles as a lineman to a prestigious job helping new businesses design their electrical installations, a job that involved a steady round of convivial meetings and lunches.

His wife, Françoise, had a good job as a pediatric nurse. They had three sturdy little boys; they had recently had a handsome house built with all the modern comforts; they had a spanking new country home on the Brittany coast that Richard had reconstructed single-handed out of a ruined stone house. In the France of 1982, what more could anyone ask?

Yet Richard Hurbain was growing unhappier every day in Montfermeil. It was no longer the Montfermeil he had grown up in, a pleasant little town a whole 15 miles away from the big city, where a boy like Richard Hurbain could become an expert gardener by the age of 11 and learn how to construct a beehive and make plum brandy in a wooden barrel. It had turned into just another featureless extension of the metropolis, full of stress and noise and dirty air, with traffic-choked streets running monotonously through identical blocks of concrete. It had become a place where there was no room for a man to raise a rabbit, where the stars could not be seen in the polluted sky.

He dreamed of a house in the country, with animals and fresh vegetables, and sometimes of the medieval castles hulking on their hilltops that he had so admired as a little boy when his family drove down the Rhône Valley to visit grandma near the Mediterranean coast. He was always stopping off at real estate offices on his way to work to consult brochures about stately country houses, restful rustic retreats, shady rural hideaways.

And then one day in November 1982, in a publication called the *Indicateur Lagrange,* he found all that he was looking for and more: "Feudal castle constructed in the 14th century (exceptional architecture), 2 hectares, 790,000 francs," read the headline. Beneath it was a photograph showing a view through an entrance gate of a giant donjon (the castle's massive inner towers, or "keep") dominating open countryside for miles around.

He learned that this castle was in the distant Indre Department, and the following Sunday he loaded his wife and their three young sons into the family station wagon and drove 200 miles south almost to the dead center of France. They were still several miles short of their goal, when at a turn in the road they all five uttered one collective gasp of awe and admiration at four distant towers glittering in the noonday sun, soaring a hundred feet and more over the wheat fields and hedgerows and woodlands of the quiet countryside. The closer they got, the more enthusiastic they became. Yes, there were holes in the roofs and cracks in the walls, and piles of debris, and a general air of abandonment and decay, but the walls were so massive and rose up so royally into the bright blue sky that Richard could not believe that the elderly couple who were visiting the chateau at the same time were not as eager as he was to snap it up at such a bargain price. "I am buying this place!" he shouted to the lady who was showing them around.

There was not a moment of doubt in his mind. "One look was enough. I signed a contract within an hour of seeing the property," he says today. "I knew I was right."

The boys, Vincent, Luc and Gilles, then 11, 8 and 5, were all as thrilled as he was at the idea of moving to a genuine castle that might have popped out of a storybook. Françoise was aghast. "I made a face," she admits. As a practical Frenchwoman she could see all kinds of practical difficulties ahead.

But she also knew her husband. She knew that he was the kind of man who, once he had made his mind up, would never look back. "Go straight for your goal," Richard likes to say. When the chips were down, Françoise had always stood by her husband, and by the day before Christmas everything was settled, the papers were signed and notarized.

With the tools he used most for restoration, Sarzay's savior confronts the world, clearly ready for more work.

Picture of Sarzay taken in 1872 shows a crumbling wall and jagged cracks in its towers, some split further by invading ivy. When Hurbain arrived, the chateau, pillaged by locals, had deteriorated even more.

The first of the practical difficulties, and in some ways the easiest to solve, was raising the money, about $150,000. A substantial sum—but this was a castle! They did it by taking out a bank loan at the usurious rates current in the early 1980s, and by selling everything they had—the house in Montfermeil and the place in Brittany. They even used up a small inheritance from Richard's grandmother.

Then came the wrenching task of uprooting the family from their lively urban life, which was the only one they had ever known, and moving them to a somnolent rural village barely aware of the 20th century. There was no lack of friends and relatives to tell them that the whole idea was pure folly, a leap from comfort and security into a black hole of unknown discomforts and dangers. How were they going to pay the bills?

The family moved in definitively in 1983. Françoise managed to get work fairly quickly, but it took 15 months for Electricité de France to find something for Richard to do down in the boondocks, and when they finally found it, it meant a brutal drop in seniority. After a dozen years of climbing the employment ladder, he had to start over again at the bottom, as a meter reader, driving every day within a 20-mile radius, reading 52,000 meters twice a year.

Still, here was Richard Hurbain, ensconced now as chatelain of Sarzay in the Indre Department, successor to the noble knight Guillaume de Barbançois, who had started building the castle in the 14th century in the darkest days of the Hundred Years War, to defend the heartland of France against English invaders.

There was not a drop of blue in the blood of the Hurbains; as far back as anyone could remember, they had always been ordinary working people. The only time the wings of history touched them was during the German Occupation in World War II, when Richard's father served for some months as driver for a local resistance leader named François Mitterrand, later to become president of France. No matter. The new chatelain was going to be worthy of his chateau. When he read in an old book that the Knights of the Order of the Golden Fleece never swore a mighty oath except in the presence of a noble bird like a peacock or a pheasant, he bought some peacocks for his courtyard, and in the presence of one of them he swore that he would restore Sarzay to at least an approximation of its ancient glory.

The glory days were long gone from the Sarzay he had purchased. It was in fact an utter wreck. With its battle-

Last year Robert Wernick wrote about Reno (June), sound bites (August), Malta (September), the Know-Nothings (November) and George Sand (December).

mented towers and its chapel and its outhouses and stables and courtyards and moats and drawbridges and portcullises and two great circular walls with their 38 turrets, it had once covered more than ten acres, and represented all the refinements of 14th-century military architecture. But it was barely finished before the introduction of artillery into warfare made it obsolete. The next 500 years were a history of slow decay. After 200 years the Barbançois family had to sell the property, which gradually became nothing more than a rambling group of abandoned farm buildings with the stately donjon rising awkward and useless in the middle. The 19th-century novelist George Sand (SMITHSONIAN, December 1996), who lived only a few miles away, used it as the background of one of her novels, describing it as the pitiful wreck of ancient grandeur.

Eventually the French government declared it a *monument historique,* a national treasure, and in 1967 it was put on a list of historic structures in danger of destruction. But the government's Office for Historic Monuments had neither the money nor the will to do anything serious about preserving it and, except for a roof repair job in the 1930s, left it strictly alone. By the time the Hurbains were ready to move in, most of the defensive walls of the moat and the turrets had been pillaged by local farmers for stone to build houses and fences. The chapel had become a chicken coop, the donjon's upper stories a granary, its ground floor a pigpen. Clumps of ivy had sprouted out of the walls and caused huge cracks. The fireplaces were broken; the floorboards and ceilings and doors were either rotting or completely rotted away. The windows from which knights and ladies used to lean and archers used to look out for English raiders to shoot at were now blocked up or had become empty jagged holes through which crows and pigeons flocked to build their nests.

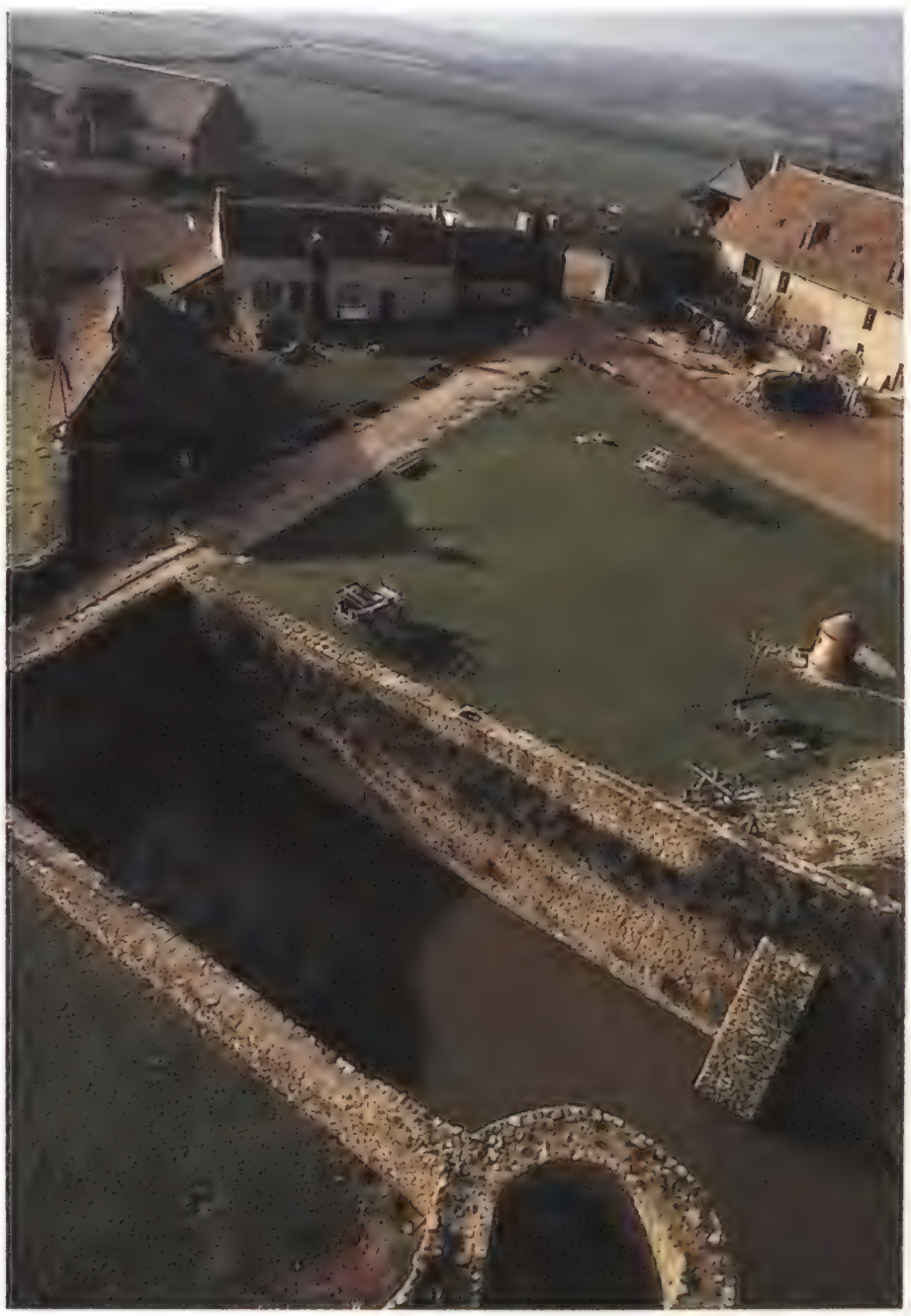
A cottage built next door in the 19th century was not in much better shape, its roof open to rain, the wind whistling through walls that had never seen an electrical wire or a water pipe.

Elie Bonnin, who was born across the road, remembers Chateau Sarzay from the time when he was growing up in the 1960s. He and his playmates had no idea that the place was a national monument or anything at all but a tempting—and dangerous—heap of stones to play in. They used to throw ancient stones at each other and rip off pieces of ancient woodwork to make swords and bows and arrows for bloodcurdling war games. Lacking boiling oil, these defenders of Sarzay would pour pots of dirty water from the battlements on the attacking English below.

Bonnin remembers how the previous owner, a prosperous farmer, used to complain to anyone who would listen that his towers were nothing but an eyesore and a burden, taking up what could be valuable land, and how he came by one day smiling from ear to ear to boast that he had found a *pigeon,* a sucker, who was going to pay good money to take them off his hands.

Most of Richard Hurbain's new neighbors in the village of Sarzay were inclined to agree that the "foreigner" (even today, if you come from more than 20 miles away from Sarzay you are an intruder and a suspicious character) had made a ludicrously bad bargain. Everyone knew that the old hulk looking down on the village was a worthless ruin. A government architect had once estimated that just digging out the moat would cost four and a half million francs. Where was a solitary interloper from Paris, a mere workingman, going to get that kind of money?

As he set out to fix up his castle, Hurbain's lowly job turned out to be a blessing in disguise, for meter reading is about the only occupation left in modern life that allows you to walk openly and regularly right into people's houses and chat with them if they are so disposed.

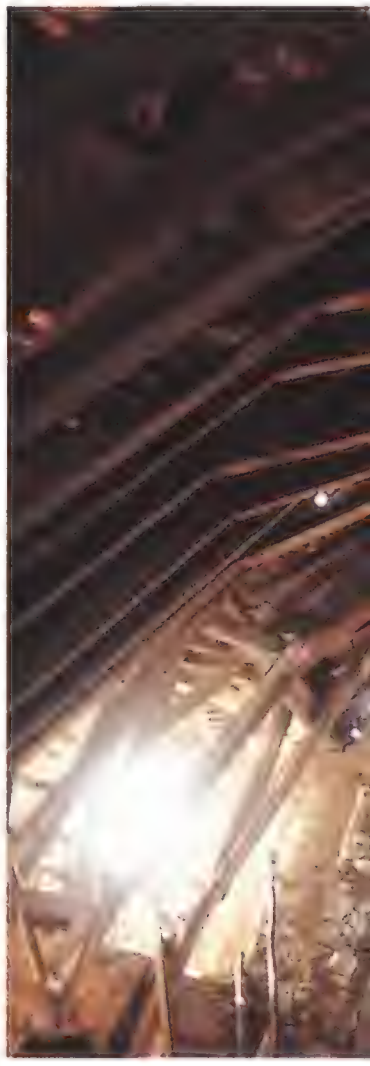


View from the tower shows the moat and courtyard with restored barn, right, and main gate in the distance.

With this entrée, Richard both picked up and delivered the latest gossip. Sometimes his visit would coincide with one by Françoise, come to deliver a flu shot. Richard also learned where old houses were being torn down so he could salvage old stones, old beams, old pieces of furniture—not to mention old handmade nails that he could not afford to buy but needed for his restoration plans. In the course of time, the wall of local reserve and suspicion began to crumble.

Richard was a repairer and a rebuilder born, a good carpenter, a good mason, a good digger and delver, and he loved to work. He soon learned that he would have to do the work mostly by himself. The Historic Monuments people in Chateauroux, the nearest administrative center, were theoretically on hand to pay up to half the cost of repairs necessary to save the precious patrimony of France. But they were by necessity civil servants who are required by law and custom to spend most of their time moving papers around, drawing up reports, consulting experts, reviewing previous reports and previous experts, pulling strings to get authorizations, pulling strings to get appropriations, reviewing, appraising and revising, and it often happens that by the time everything is signed and countersigned, prices have gone up so much that the whole process has to begin over again. They had worked all their lives to acquire their specialized knowledge and their grade in the administration, and they could hardly be expected to understand what a penniless outsider, with no university degree and no officially recognized expertise, was doing on their turf. On one occasion they gave Richard Hurbain some money to repair the roof of his chapel, but most of the time they simply filed away his letters, did not bother to return his phone calls and waited for him to go away.

For eight years he worked modestly and methodically, with hammer and saw and pickax and wheelbarrow, though he eventually bought a tractor and a backhoe, secondhand. But mostly the work was done with his own two hands. As his boys grew up, he counted on them to dig and cart away rubbish, too, and help him lift heavy objects and keep the animals fed. On meter-reading days he would be up at dawn and work a couple of hours till it was time to start his rounds, and after a full eight hours of doing that, he'd work three or four or five more hours on the chateau. On weekends and holidays and vacations he worked 10 or 12 hours. He is an orderly man, and likes nothing better than to chart out in bed at night just how many stones he is going to lay or how many cubic yards of dirt and debris he is going to move



After shoveling tons of dirt from the Great Hall, Hurbain replaced the floor with tiles collected in the region. Elegant oak roof beams (right) date from the 1400s.

the next day. Day after day, year after year, in seedtime and harvest, in good weather and bad (fortunately for him, these were years of drought, so the rains only rarely undid his day's work), he shoveled and plastered, filled up chinks, rebuilt retaining walls, rebuilt fireplaces, replaced doors and floors and windows, cleared away five centuries' accumulation of muck.

Was he ever discouraged by the sheer size of his self-imposed task? He doesn't understand the question. He had a job to do and he did it. Of course, some phases of the work posed more problems than others. It is not always easy to get 150-pound stones or 200-pound oak beams into place. Once when he was paving his courtyard, he was too busy to notice that the tips of his gloves were worn away, and so were his fingernails. It took a year, but they grew back.

He worked for most of the year 1984 with shovel and wheelbarrow, cleaning out some 80 tons of the pigeon droppings and assorted debris that clogged the rooms in the middle of the donjon. Over the next three years he restored the floors—scouring the countryside to find old planks—and the fireplaces of the donjon. He tore up a concrete floor that had been put in for the pigs and replaced it with 4,500 tiles which he found, a few here, a few there, around the region; 1988 was the year of the chapel roof, 1989 the year he made the gatehouse into a welcome center. There he could sell tickets and postcards, and visitors could sign their names.

One day he noticed a spot of green in the middle of some dead weeds in the castle courtyard. He dug into it and discovered signs of an ancient well. He cleared out its walls down through 35 feet of rubbish to reach a spring that had kept Sarzay provided with fresh water 500 years before—as it does again today.

Three more years went into cleaning out the north and west sides of the moat. It had been used by its thrifty proprietors for the past century and a half as a garbage dump, and the upper parts of its retaining walls on both sides had been pulled down by scavenging peasants. Day by day, with pick and shovel and wheelbarrow, he cleared out the mess of dead trees and dead animals and rusted bicycles, broken crockery and defunct tires and sifted out the old stones, painstakingly using them to build up the walls to a height of 16 feet. When at last he had dug his moat down to its original level, he was delighted to see it fill up with water seeping in from the neighboring marsh, till it became sparkling clean. It was time to stock it with carp.

He cleaned out the horse stables and cow stalls and turned them into a lofty medieval hall where people

Richard's wife, Françoise, a trained nurse, was cool toward the project at first, then loyally pitched in.

Cluster of towers that makes up the castle's donjon is seen through the archway of Chateau Sarzay's main gate. If besieged, ancient owners defended the outer wall as long as possible, then retreated to the towers.

could come and play medieval music and have medieval banquets. He turned a 1750 farmhouse into a big airy residence with a computer to help keep up with Sarzay's voluminous correspondence, as well as an 1841 grand piano and a Louis XIII staircase that he noticed on one of his meter-reading rounds when it was about to be done in by a house wrecker. He planted fruit trees, flowers and vegetables. He raised ducks and geese and chickens and rabbits and goats and no end of dogs and cats, and of course peacocks. He collected ancient books and ancient carts and ancient tools.

The last living descendant of the Barbançois family, an elderly widowed baroness, came to see her ancestral property and was deeply moved by the way the sad old wreck was being transformed. As a parting gift, she left the motto that was written on the family escutcheon, "*Audaces Fortunat juvat timidos que repellit.*" "Fortune favors the bold and scorns the timid."

"Bold" was always the word for Richard Hurbain. He worked with passion, but he also worked with care. Nothing was done at random. He studied medieval architecture and medieval building techniques; he consulted old archives; he studied photographs and an oil painting done on the spot in the 1870s by George Sand's son. He learned from daily experience how to work without machines or blueprints—never knowing when a piece of junk he had picked out of a dump might turn out to fit perfectly into the jigsaw puzzle of his castle—but always with a clear picture of the whole structure in his head. Everyone who has seen him at work regards him as an expert, but he will admit that to this day there are some things neither books nor experience have been able to teach him, such as how to keep peacocks from flying over hedges and fences and, with no regard for scarecrows, eating the tomatoes, strawberries and green beans from the garden.

The suspicions of the villagers have slowly begun to give way to curiosity and, for some, even to frank admiration. Sarzay is a typical contemporary French village abandoned by many productive citizens, where all signs of commerce have long since disappeared except for a couple of small cafés. But thanks to Richard Hurbain, new traffic began to break its deathly silence. Passers-by who happened to be driving through the countryside stopped to see what was going on. There was no money for an advertising budget, but little by little, word got around. Tourists came from Paris, from England, from Holland, from the ends of the earth.

Hurbain started charging 10 francs, and later 25, for admission and a tour of all five floors of the castle and the chapel and the grounds, conducted by the very knowledgeable guides who were his sons. The people who came to Sarzay were the kind that local authorities are ordinarily glad to see, because they ventured far off the usual routes of French tourism, to a land without autoroutes or fast-food restaurants, and they came not

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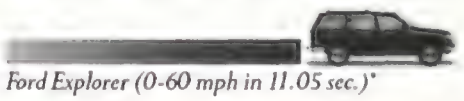
Subaru Outback (0-60 mph in 10.03 sec.)*



Ford Explorer (0-60 mph in 11.05 sec.)*

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	Subaru Outback	Ford Explorer XLT	Chevrolet Blazer LS	Jeep Grand Cherokee
EPA Fuel Economy (city/highway est.)	21/27	15/20	16/22	15/20
Ground Clearance (in.)	7.3	6.7	8.3	7.8
Front Legroom/ Headroom (in.)	40.2/43.3	39.9/42.4	39.5/42.4	37.8/41.4
Pricing	$23,790	$27,380	$26,373	$27,840

Of course, speed isn't the only reason the Subaru Outback is off to such a fast start with car buyers. Its unique hybrid design combines the smooth ride and fuel economy of a passenger sedan with the rugged capabilities of a sport-utility, for a driving adventure like no other. There's also the added security of the Subaru All-Wheel Driving System, which allows the Outback to constantly monitor changing road conditions and transfer power from the wheels that slip to the wheels that grip. You'll find plenty of other safety features, too. Including four-channel ABS, side-impact beams, crumple zones and standard dual air bags.†

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Hurbain's sons (from left) Vincent, 25, Luc, 22, and Gilles, 19, have all gone into building and engineering.

out of a sense of duty but because they were genuinely interested, unfailingly delighted and stimulated by what they saw. It wasn't every day you could see something like medieval life going on in front of you.

Visitors might find the chatelain himself raising the wall of the moat stone by stone. A volunteer from the Czech Republic sharpening his ax on a medieval grindstone. A volunteer from Illinois selecting stones. A medieval pot boiling potatoes over a wood fire to feed the geese. Bread thrown in the moat for the carp and the ducks to fight over. Girlfriends of the Hurbain boys sifting through hundreds of pottery fragments found at the bottom of the moat, to reconstruct the dishes that were thrown out when the Barbançois had to move out three centuries before. Squads of volunteer Boy and Girl Scouts who are digging down through centuries of accumulated weeds and dirt to uncover the beautifully regular stone paving of the courtyard. Cocks crow, ducks gabble, roses flower, peahens teach their chicks how to flutter up the woodpile from log to log.

Before they go, most of the visitors will sign Richard's *livre d'or* (guestbook), which by now runs to 16 large school notebooks of 96 pages apiece, each page filled with comments. Most, naturally, are in French, but you will also find comments in English, German, Dutch, Polish, Japanese, Hebrew, Arabic and Italian. In all their different styles and dialects they all say the same thing over and over again: *Bravo! Magnifique! Quel courage! Eblouissant! Epoustouflant! Titanesque! Fascinant! Superbe! Wonderful! Het is erg mooi! Idealisten wie Sie sind selten geworden in dieser Welt! Entrando qui sembra di revivere un'altra epoca—Complimenti! Bravi! Courage! Courage! Courage!*

François Léotard, the French Minister of Culture, sent a note of commendation and an assurance that he would try to get some money allocated to help with the work on the chateau. ("Fine words," wrote Hurbain in the margin, for he was never to see any of that money.) The Ministry of Tourism presented Hurbain with a bronze star in January 1993.

There was a single discordant note in the chorus of praise. One day in 1994 a gendarme drove up with a summons to appear in court. It turned out that the preservationist bureaucrats had had their eye on Richard Hurbain for years and now had caught him in the act. He had been repairing walls and clearing out moats without first filling out all the necessary papers and getting the necessary official approval. He had compounded this crime by doing all the work himself—instead of paying a fortune to get it done by government-licensed contractors. In short, Hurbain was in willful disregard of articles 9, 13b, 13c, 30 and 30b of the law of December 31, 1913, and articles 1 and 20 of the law of September 27, 1941.

By digging up all that garbage in the moat, Maryvonne de Saint-Pulgent, president of the Office for Historic Monuments, explained to the press, "he might have been undermining the walls of the chateau." Through one of those coincidences that would create critical derision if they appeared in a movie, 48 hours after the gendarme had delivered his warrant, the authorities sent a bulldozer to the nearby village of Montipouret to dig a ditch for a retaining wall to help "consolidate and preserve" a 12th-century church; and by 7:30 that evening the north wall of the church transept had all fallen down, eventually requiring repair at a cost of 1.4 million francs of French taxpayers'money by the private firm of the government architect who had ordered the bulldozer in to begin with.

As anyone but a high-level government bureaucrat could have foretold, the news of these events was greeted with raucous laughter and loud indignation in Sarzay, all over France and even beyond the frontiers. Private citizens and organizations devoted to the preservation of old buildings and historic sites rallied to the defense of Richard Hurbain. How did it come about, they asked, that an agency responsible for overseeing 38,879 historic monuments, 18,988 of them in private hands—of which a depressingly large number are falling to pieces for lack of adequate care—should decide to concentrate the fires of its wrath on this single man? Especially, as Anne-Marie Lecoq, head of MOMUS,

In its incarnation as a historical museum—hay cart dates from 1800s—Sarzay presents a peaceful spectacle.

an organization dedicated to saving monuments and museums in peril, puts it, a self-taught man with a genius for reconstruction, who saved his monument with "an astonishing mixture of skill and good taste," almost entirely with his own hands, paying for it almost entirely from his own meager resources? If Richard Hurbain were in Japan, she says, the government would declare him a national treasure and encourage people to go learn from him, not drag him into court for what are at worst very minor infractions of very complicated rules and regulations. Says the Marquis de Breteuil, head of La Demeure Historique, an association for private owners of historic buildings: "You deserve congratulations, not a condemnation."

Hurbain was very hurt by the legal action. He admits, though, that he could not have asked for better publicity. The spectacle of this ordinary citizen fighting through all the physical and administrative obstacles has quickened the hearts of people everywhere. In the past two years he has appeared on all the French television channels. He has appeared in local and national newspapers and magazines. He has appeared in the *Sunday Times* of London, and in German and Dutch magazines. The flow of visitors, which had reached 8,000 a year, has now doubled and promises to triple.

The case of the French Republic against Richard Hurbain came to trial in January 1996. Since there was no doubt that he had failed to fill out all the proper forms, the court had to find him guilty. He was fined 10,000 francs. The fine was then suspended, meaning that he was getting little more than a slap on the wrist, though the conviction stands. He is dismayed, in part because, as he says, the decision will discourage other people from trying to preserve France's heritage.

He has been able to take early retirement from Electricité de France, and will have more time to fill out the forms demanded by the Office for Historic Monuments. A man who all by himself cleared out 80 tons of garbage from the moat of Sarzay is not likely to be bullied by towers of papers or by legions of government bureaucrats. He has a huge audience now, and he knows that audience is with him. His livre d'or is filling up more and more with sentiments like those expressed by two young visitors last August: *"Ne lâchez pas le morceau."* "Don't let go." And, of course, he won't.

Fortune favors the bold.

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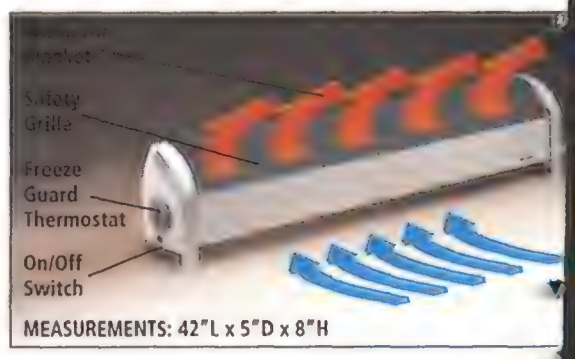

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You should be concerned about the quality of your household drinking water. The EPA estimates that 27,000 of the country's 42,000 public water supplies would not meet their water safety standards. The simple fact is that no matter how clean and pure the water is that leaves the public water facility, by the time it reaches your tap, it can be contaminated with bacteria, sediment, bad taste and odors. Introducing *WaterWare* by Culligan, the leader in water treatment for over 60 years. The WaterWare is the only faucet mount filter system that uses the same fiber bundle filter technology as state-of-the-art dialysis medical systems. It is so effective that 94% of all bacteria are eliminated and chlorine, sediment, bad taste and odors are reduced by more that 98%. What's more, the WaterWare's longer life 300 gallon filter lasts 33% longer than ordinary faucet mounts. That gives the average family of four a three month supply of healthy drinking water. Takes just seconds to install and it's a snap to change filters. Certified for use in California by the State Department of Health Services, the WaterWare works where other filter systems are likely to clog prematurely. Easily shifts from filtered water to unfiltered spray and unfiltered stream in three easy moves. ***$69.95*** ($7.95) #7600. Replacement Filters (Set Of Two) ***$39.95*** ($5.95) #7650.

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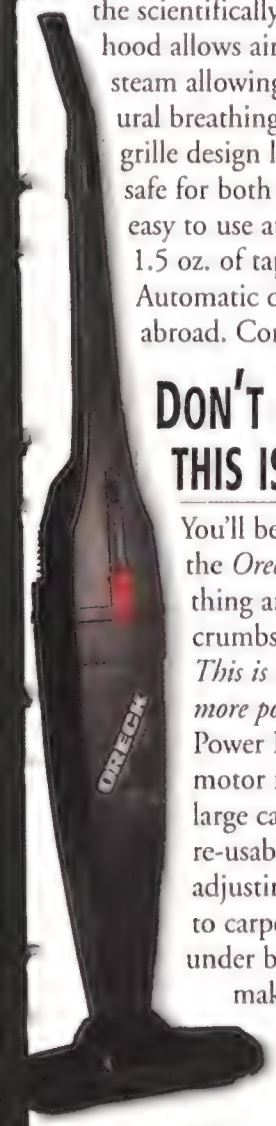

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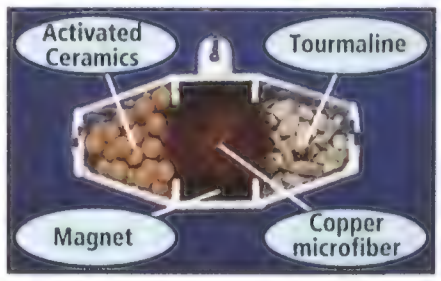

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By Sue Hubbell

Let us now praise the romantic, artful, versatile toothpick

Flirting, scale modeling, putting on the dog—through the ages, the device has been used for a lot more than dental hygiene

Fifty years ago and more, when I was in the sixth grade, a bad boy named Hughie Mehaffie regularly soaked toothpicks overnight in liquid cinnamon and brought them to share around. Miss Barton, our teacher, seemed to regard them as a 1940s version of a controlled substance, for their use was forbidden. So, of course, we were mad to have them. We would put up our desktops, slouch down behind them and savor, especially, that first mouth-burning taste. The toothpicks would disintegrate into frayed but tasty woodenish pulps as we sucked and chewed them illicitly. Hughie had dreamy blue eyes and long curly eyelashes and I loved him to distraction.

Not so long ago, I was driving across Maine and came to the town of Strong, which proudly calls itself "The Toothpick Capital of the World." There I saw a towering pile of birch logs stacked beside a mysterious-looking red factory building. I wondered how a log becomes a toothpick, and upon further reflection, I wondered how long people have been using toothpicks, cinnamon or otherwise.

For a considerable time, it turns out. The use of toothpicks even predates our species. Neanderthal skulls, as well as skulls of early *Homo sapiens*, have been unearthed showing clear signs of having teeth that were picked with a tool. Christy G. Turner, an anthropologist at Arizona State University, declares, "As far as can be empirically documented, the oldest demonstrable human habit is picking one's teeth."

Agathocles, tyrant of Syracuse, died a painful death in 289 B.C. when he applied his postprandial toothpick, which had been soaked in poison by an ill-wisher. The prophet Muhammad was such a regular user of a toothpick carved from aromatic aloe wood dipped into the holy-water fountain at Mecca that he assigned its care to a servant known as the "master of the toothpick," who carried it behind his ear. The Parsi, who migrated to India from Persia between the eighth and tenth centuries, are said to have considered the use of the toothpick a religious rite. The Gonds, arriving a few centuries later, may have buried their dead with toothpicks, presumably for use after afterlife meals. The Renaissance French served them at table, at first stuck into the dessert, and later presented with a plate and a napkin at each place setting.

Over the centuries, those of the upper classes who had the resources to devote themselves to the arts used fancifully shaped toothpicks often made of gold, silver or ivory and inlaid with precious stones. A body of etiquette grew up around their use. Some of it was codified in 1393 in a publication from Innsbruck known as *The Tanhausers Court Manners*, which advised that poking around the teeth with a toothpick during the course of a meal was as grave an offense against manners as "sneezing and snarfeling into your hand while eating at table." I found this morsel in a 1967 work, *Der Zahnstocher und seine Geschichte* (The Toothpick and Its History) by Hans Sachs, complete with 87 illustrations of important toothpick holdings in private collections and museums. Sachs, whose day job was dentistry, called the Renaissance "the golden age of toothpicks" and included in his study reproductions of painted portraits of the wellborn with neck chains from which dangled exquisite toothpicks.

So important was the crafted, precious, permanent toothpick that it became a notable dowry item. The infanta Louise Marie Therese of Parma, for example, came into her marriage to a prince of Asturias with a listed dozen valuable toothpicks. By law, in Saxony, a woman's toothpick was her own to keep, although its holder, often a bejeweled casket, was not. A good-manners book for ladies first published in 1716 defined toothpicks to be silver tools "with which the wench, when something comes between her teeth during eating, can free such particles." Three ivory toothpicks used by Goethe's mother came to rest in the Goethe museum in Frankfurt, Germany. (Mutatis mutandis, a 23-year-old toothpick taken out of a warm-up jacket that belonged to the former New York Mets pitcher Tom Seaver landed in a private collection after it was auctioned off for $200 in 1992.)

In the 1800s, after the invention of the steel pen, one

While ancients gather at a toothy shrine, a modern schoolboy offers his beloved a cinnamon-flavored pick.

Illustrations by Jack Williams

A man named Joe King used 110,000 toothpicks to build a 23-foot-high likeness of the Eiffel Tower.

Monsieur Bardin of Joinville le Pont, near Paris, found himself the owner of two million geese and without a ready market for goose quills. He produced an early mass-market quill toothpick for those who could not afford the more artful permanent models still being plied by the elite. At about the time Bardin was wondering what to do with his geese, a young man named Charles Forster, perhaps an Englishman, perhaps a Yankee, was keeping books for an English export company in Brazil. There he saw large, hand-whittled wooden toothpicks, made in Portugal, boxed and sold cheaply as disposables. They must have struck Forster as a clever novelty, for he bought some and sent them to his wife in Boston, who offered them round to her guests.

Forster joined his wife in Boston in 1865 and went to work for a wooden shoe-peg manufacturer, who allowed him to experiment with equipment in the factory. Forster was trying to develop a machine that could cut toothpicks mechanically. By 1869, he had created one that was similar in many respects to those still in use in Strong. It could produce in a minute as many toothpicks as Portuguese whittlers could turn out in a day.

After trying several kinds of wood, Forster selected white birch from Maine as the best material (it was easy to manufacture and left no taste) and had logs cut from the forests there delivered to Boston. He then possessed raw materials and a machine but no market for his toothpicks. In an interview, Forster showed himself to be not only an inventor of machinery but a marketing strategist. He said, "The restaurant owners . . . in Boston weren't interested in my toothpicks. They didn't think that proper Bostonians would want to sit around after dinner picking their teeth with a slender piece of wood. . . . By a stroke of good fortune I came across some Harvard scholars. . . . I offered to pay for their dinners if they would help me sell my toothpicks."

Forster's first target was Boston's well-known Union Oyster House, which is still in business at the same location near City Hall. He explained his strategy. "After dinner, the Harvard student, in a loud voice, was supposed to ask his waiter for a toothpick. If the restaurant didn't have any, then the young man was supposed to complain loudly, and inform the waiter that he would never again eat in the establishment."

After five or six Harvard men had left the restaurant in a well-rehearsed huff, the Union Oyster House began buying Charles Forster's toothpicks, and a business was born. A few years later, Forster moved his toothpick factory to Maine to be nearer to the source of wood. To this day, the building at the Strong plant location still bears the name of Forsters, Inc., although ownership has long since passed out of the family's hands.

Inside that red factory building there is more machinery and a much smaller workforce than in Charles Forster's time. This is the biggest toothpick manufactory in the United States. "Maybe even in the world," says Richard Campbell, vice president of Maine operations, "although there is a factory in China that might be bigger." The computer-driven machinery, like something out of Charlie Chaplin's silent movie *Modern Times*, with sound effects added, thunders, clunks, clatters and speeds materials on their way. The last person ever to touch a potential toothpick is the logger who cuts the birch. Only ten humans are needed to produce an average daily output of 20 million toothpicks.

Here's how you make a toothpick in 1997. A mechanized beak grabs a log from the woodpile and loads it onto a conveyor belt, where it is cut into lengths about half the size of a fireplace log. These smaller bolts run through a peeler and are conveyed to a steam room to absorb heat and moisture. Soggy and hot enough to be

Author Sue Hubbell, a frequent contributor to these pages, has written about butterflies, taxonomy, five-and-dime stores and, most recently, pumpkins.

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as flexible as a wet noodle, they enter a veneer-cutting machine, from which the wood oozes like long lengths of spaghetti exactly one toothpick thick, and then go on to a slicing machine, where they are transformed into little toothpick-size blanks. On the plant's heated top floor, those blanks are tumbled and dried and then drop down by gravity into lower-level tumblers where they jounce against one another, polishing themselves, each to each, in the process. They drop into still lower machines, which point each end and feed them into welcoming boxes that are whomped shut by another machine. They are ready to be sent to the shelves of stores around the country. Excluding the day spent in the steam room, the entire process from log pile to boxed toothpick takes a couple of hours.

Campbell, who made an exception to the company's no-visitor policy when he took me on a tour, is entrepreneurially vague about how many toothpicks a cord of wood will produce. "I once figured," he says, "that our production each year, laid end to end, would circle the globe 30 times."

People do more than pick their teeth with toothpicks. Campbell tells me about a prison inmate on death row who routinely sent him elaborate sculptures made out of toothpicks. A man named Joe King once used 110,000 toothpicks to create a 23-foot-high replica of the Eiffel Tower. It took Wayne Kusy of Evanston, Illinois, two years and 193,000 toothpicks to put together a 16-foot-long replica of the British liner *Lusitania* (below). A Californian, at what he said was God's bidding, spent five years building a life-size figure of a crucified Christ out of toothpicks, which stirred a theological debate over whether God would tell anyone to do such a thing.

I must report that toothpicks are not without their dangers. According to the Consumer Products Safety Commission, they account for about 8,800 accidents annually through inappropriate pokings and piercings. But the all-time worst bad news, at least for me, was contained in a newsletter put out some years ago by the Food and Drug Administration. The agency reported an incident concerning a Nebraska firm that was producing cinnamon toothpicks so hot that "five schoolchildren suffered adverse reactions." The company was advised to tone down its cinnamon dip. It was just as Miss Barton feared. I guess Hughie Mehaffie was a *really* bad boy, but, oh my, he did have beautiful blue eyes.

Wayne Kusy of Evanston, Illinois, needed 193,000 toothpicks to complete this 16-foot-long replica of the British luxury liner *Lusitania*. The elaborate model "breaks" to expose the detailed interior in cross section.

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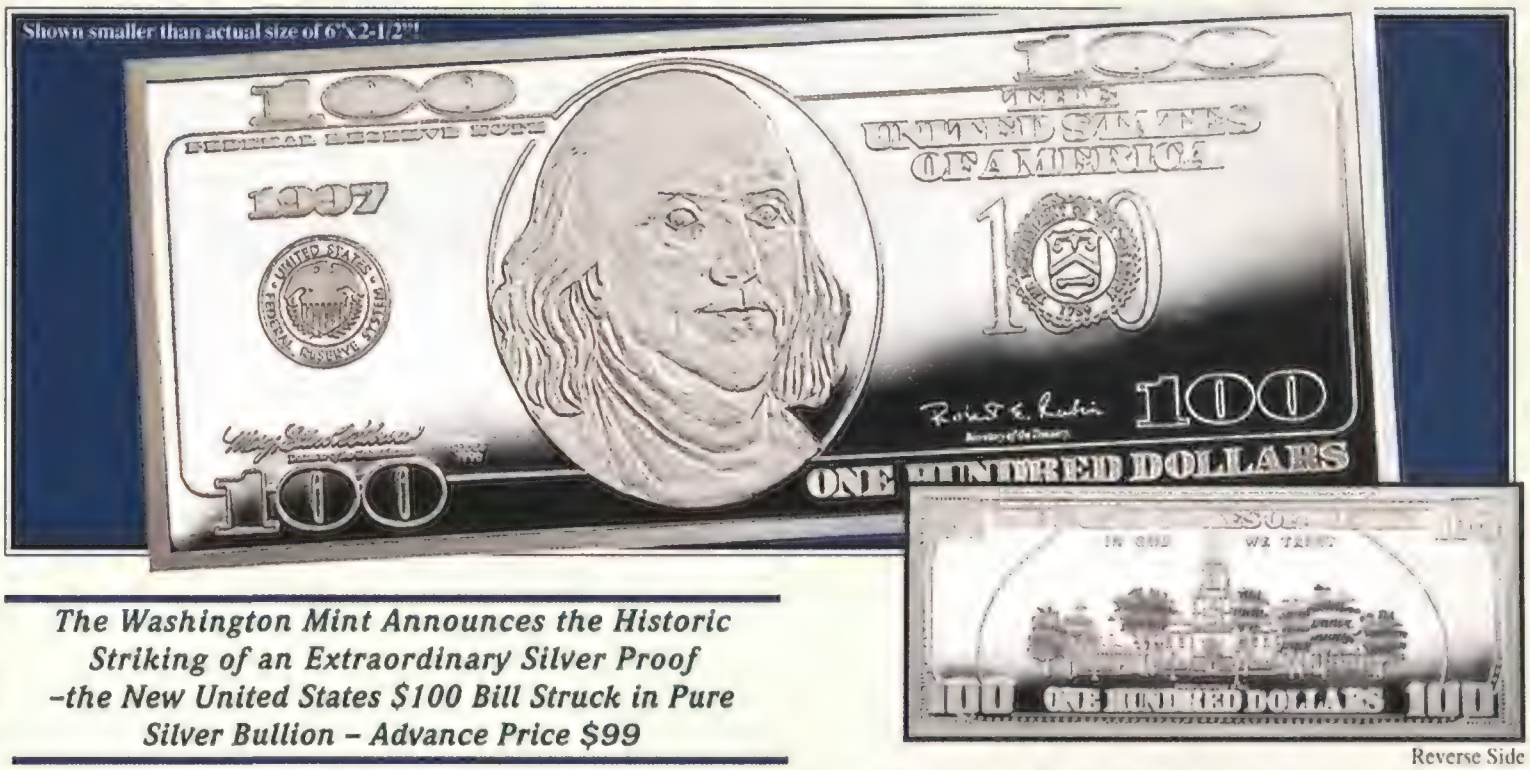

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By Simon Winchester

Sir Francis Drake is still capable of kicking up a fuss

Westward the corsair of England's empire made his way, plundering Spain for queen and country; now modern moralists are nibbling at his fame

Perched in front of me as I write is a small and elegantly made tablet of milk chocolate, brought from England by a kindly relation who paid the rather alarming sum of £10 sterling for a box of it. She had discovered it in the tourist souvenir stall that has just been built (to widespread shudders) inside the now publicly accessible quarters of Buckingham Palace.

It is sold as a commemoration of one of England's greatest heroes. "Sir Francis Drake, 1540-96," declares the wrapper. "Famous Circumnavigator and Admiral."

Larger-than-life Drake statue dominates Plymouth, home port for his round-the-world voyage. Portrait (opposite) shows him at the height of his fame.

The text notes that Drake was knighted by Queen Elizabeth I in 1581, won fame by contributing to the defeat of the Spanish Armada in 1588 and lives on "as the hero of many popular legends." He was certainly part of the imprint of pride stamped on all miniature Britons of my generation, who learned stories about Drake almost with our mother's milk.

They were stories that began in a period when tiny newly Protestant England faced Catholic Spain, then a globe-girdling imperial power. That period ended with Spain defeated, her power waning, Protestantism no longer under threat, and the long slow rise of the British Empire about to begin. Francis Drake, the stories taught us, was the man who more than any other helped set the change in motion. Boys of my age could rattle off the most famous lines from Sir Henry Newbolt's poem "Drake's Drum," rollicking lines that were supposedly called down by the departed Drake from the company of angels: "If the Dons sight Devon, I'll quit the port of Heaven / And drum them up the Channel as we drummed them long ago."

That all went well with other sagas of my youth—the D-Day invasion and the climbing of Mount Everest and the coronation of the young Queen Elizabeth II, the playing in those postwar days of Sir Edward Elgar's thumping "Land of Hope and Glory." In the early Fifties I even journeyed down to Plymouth with my uncle and walked through empty streets to the green expanse of Plymouth Hoe where Drake's statue stands.

Plymouth Hoe is the site of a famous Drake story, a moment on a July evening in 1588 when the Spanish Armada had just been spotted off England. The first in the chain of signal bonfire beacons to alert southern England against invasion had been lit. The little captain general (he was probably under 5 feet 5 inches) was playing at bowls on Plymouth Hoe as breathless aides told him about the almost solid wall of Spanish vessels, ready for attack. Would Sir Francis put to sea immediately? No, Drake is supposed to have said: "There is plenty of time to finish the game and beat the Spaniards, too."

The man was born 450 years ago on a tenant farm in a broad valley near Tavistock, a lush corner of far western England hard by the great granite dome of Dartmoor. Recent research suggests that his father, Edmund, a fiery part-time Protestant preacher, was exiled to Kent for stealing horses. There the young Drake grew up and learned seamanship, living in a hulk on the River Medway. In the Drake story, historic context is crucial. When Drake was born, in about 1543, the Protestant Reforma-

tion was still shaky; all Protestant Europe feared Catholics and especially Catholic Spain. In England, the Reformation had barely begun. Henry VIII's recent divorce had brought a tidal wave of events including England's break with the Church of Rome and the creation of the Church of England.

During Drake's career the slaughter of thousands of Protestants, on and after the St. Bartholomew's Day Massacre of 1572, occurred throughout France; and Philip II of Spain (SMITHSONIAN, December 1987) dispatched an army to suppress a Protestant revolt in the Low Countries. In England, after Henry died, his Catholic daughter, Mary, briefly ruled. Married to King Philip, she had a number of Protestant leaders burned at the stake, whence her nickname "Bloody Mary." After her half-sister Elizabeth became queen in 1558, Catholics in England were officially despised, their influence personified by fear and loathing of Spain and Philip II. He was savagely caricatured as a monster of cruelty, of papist power in general, the essence of Spain's seemingly unassailable "Evil Empire."

By comparison, England was of little consequence in global terms. It was only in Elizabeth's reign that the situation began to change. Always careful not to offend Philip too much, the queen nevertheless built up England's maritime strength, as relations with Spain evolved from uneasy alliance to strained peace to something like cold war and, finally, in 1588, to war itself.

Even while Spain and England were still officially at peace, Drake began helping this process along by raiding Spain's holdings in the Caribbean. His motivations involved an anti-Catholic religious zeal, patriotism and the possibility of huge profit for himself—and eventually for the queen's treasury—in gold and jewels originally stolen by Spain from the Aztecs and Incas.

His first attempts, after he shipped out at age 23 aboard a slaving vessel owned by his cousin John Hawkins, were by all accounts fumbling. (He was uncomfortable, it now seems, with taking part in slaving commerce, anyway.) But by the summer of 1573, ranging far from home in his own ships with a trusted band of west country seamen, he had captured "the Treasure-house of the World," the tiny port of Nombre de Dios, on the north coast of what is now Panama. As became his custom, he enlisted the help of *cimarrones*, African slaves who had escaped from the Spaniards, and marched through the jungle with them to intercept Spanish mule trains bringing sacks of treasure across the isthmus for transshipment to Spain. "*Qué gente?*" a perplexed Spanish sentry challenged as Drake's Devonians and black allies poured down on the caravan from the bushes. "Englishmen," replied Drake, coldly.

Many of the 73 men who had sailed with him the year before—two of his brothers among them—were left dead. But his ships headed home loaded with gold coins, ingots, raw and uncut diamonds and emeralds from Chile and Peru, as well as engraved scimitars, guns and charts, and Spanish secrets. When the tiny fleet entered Plymouth Sound one Sunday in August 1573, people burst out of church in mid-sermon to greet him.

Within weeks England had a new hero. Now Drake could buy land and houses and, for the first time, deal as an equal with men way above his social station. He was just turning 30, already famous for pluck and vigor, and ready to become a byword in the Virgin Queen's memorable reign. That year Elizabeth was 40; already 15 years on the throne, the monarch was willing to back Drake's exploits at sea in secret and profit hugely from his prizes. Much of the gold from his Caribbean raids enabled her to build up her own army and, most crucially, expand England's lately reorganized navy. It made good sense, she and her courtiers thought, to use this brash newcomer to let the world know that, at sea, England was Spain's rival—and more. Thus was launched

Simon Winchester is a frequent contributor to SMITHSONIAN. *His latest book is entitled* The River at the Center of the World *(Henry Holt, 1996).*

White cliffs above San Francisco, near an inlet where the *Golden Hind* was beached in 1579, led Drake to claim the land as New Albion. Opposite, top: Legend has Queen Elizabeth knighting Drake; the actual dubbing was done by the French Ambassador. Map: Spanish fort at St. Augustine, destroyed by Drake.

Drake's celebrated circumnavigation of the globe.

Years earlier, Ferdinand Magellan sailed from Portugal to the Philippines only to be killed there (SMITHSONIAN, April 1991), though one of his ships completed the circumnavigation of the globe. But no one since then had made the trip and no English ship had sailed the Pacific. When Drake set out from Plymouth on November 15, 1577, with four tiny vessels and 164 men, he was undertaking a stupendous venture.

The publicly stated purpose of the voyage was clear. With private backing from rich nobles, the queen and her favorite, the earl of Leicester, Drake was officially bound on a voyage of trade and exploration. There was even some talk of finding the mysterious Strait of Anian, as the elusive Northwest Passage was then known.

Drake's unofficial agenda was very different. Queen Elizabeth and King Philip were not yet officially at war, but Drake was to capture Spanish ships carrying the wealth of Peru and Mexico up to the west coast of South America to the Isthmus of Panama.

His four ships were puny by any standard—puny in relation to more than 30,000 miles of unknown ocean ahead of them, puny when compared with Spanish galleons that tended to displace hundreds of tons, often carrying heavy guns under mountains of sail. Drake's largest ship, the *Pelican,* measured 70 feet from stem to stern; she had just 18 small cannon. For security purposes Drake told the men they would be gone only a short while. But he had loaded his great cabin with books on navigation, as well as his Protestant Bible and John Foxe's history of Protestant martyrs, and carried musicians to boost morale. He held prayer sessions morning and evening. Dreadful weather set in quickly. Early on, too, he began having trouble with a gentleman member of the expedition named Thomas Doughty.

From the bulge of Africa they crossed to Brazil, and worked their way down to the Río de la Plata, hunting seals for meat, and taking on fresh fruit to ward off scurvy, from which—to Drake's credit—his crewmen almost never suffered. By June 1578, they were off Patagonia and headed for a hellish, labyrinthine passage known as the Strait of Magellan. It was there, before that challenge, that Drake brought disciplinary matters to a head. Drake was a defiantly common man and a seaman who on occasion hauled on the lines with the crew, and he expected gentlemen to do the same. Doughty

was an arrogant, well-connected aristocrat and a representative of the expedition's noble financial backers. From the outset he treated his captain like a social upstart. In Port St. Julian, Drake ordered Doughty to stand trial for planning mutiny. He was charged with challenging Drake's authority and fomenting trouble by urging that the expedition reach the Pacific by sailing around the tip of Africa. Several times he had disobeyed Drake's orders to the fleet.

A jury of his shipmates found the man guilty. Though Drake was on shaky legal ground, because he seems not to have carried an official commission from Queen Elizabeth, he ordered Doughty beheaded.

The night before, both men were shriven of their sins, and Doughty and Drake had dinner together. But once the ax had fallen next morning, Drake had the prize held up by its hair. "Lo," he said, "this is the end of traitors." He was troubled by the execution, however. And he swiftly renamed his ship. The *Pelican* was rechristened the *Golden Hind*, now one of the most famous vessels in history. Drake's latter-day detractors, largely overlooking the crucial danger of a divided command at sea under such circumstances, make much of the execution and even the name change. The new name, they point out, had immediate political and fiscal advantages: it was chosen to curry favor with Sir Christopher Hatton, one of the rich backers in England (and a close friend of Doughty's), who sported a hind on his coat of arms.

Splendid moment in Drake legend has him coolly refusing to let arrival of Armada interrupt game of bowls in 1588; the anecdote didn't surface till 1736.

Only the Golden Hind *was left*

Drake's three remaining ships made swift passage through the strait, 363 nautical miles in 16 days. Then a terrific storm fell upon them, pounding and battering for 52 days. The fleet lost contact. The *Golden Hind* was driven miles south and had to fight its way back. When the storm blew itself out, only the *Golden Hind* was left. One ship had turned over, and the other turned back, eventually limping home to England where Drake was duly reported drowned and his ship lost. Sometime after the storm, Drake put ashore on Horn Island, at the extreme tip of the continent, in search of new antiscorbutic fruits. Fifty years later the Dutch claimed the first sighting of the Horn, but a few contemporary charts show that it was Drake who first discovered the fearsome cape.

Free of the Horn, he swept north off Chile and Peru, taking ship after ship from astounded and outraged Spaniards. This, at last, was what he had come for: to plunder the papists in the name of the Protestant Queen! The process reached a nautical and remunerative climax with the capture of *Nuestra Señora de la Concepción*, a galleon loaded with silver, gold and diamonds worth £125,000 in Tudor money, billions today.

Eventually he sailed north past what is now California, to reach a latitude possibly as far north as Vancou-

Helter-skelter English painting of fight with Armada used ships for purposes of propaganda or design. In foreground, two English ships trap a Spanish galleass.

ver. Finding no sign of the Northwest Passage, he turned south to find a safe place to haul his barnacle-heavy and leaking vessel and careen it for caulking and repair. On June 17, 1579, he made landfall. Exactly where has been hotly disputed, but commonsense odds are that it was just north of San Francisco, in an estuary known today as Drake's Estero, at the western end of Marin County's seemingly endless Sir Francis Drake Boulevard.

For five weeks his exhausted men rested, replenished supplies, worked on the ship and built a small settlement. They also mingled enough with peaceable locals to introduce genes that led to blue-eyed Miwok Indians being spotted in the forests as late as the 18th century. Drake left a brass plate (with a sixpenny piece hammered into it for authenticity) formally annexing the land—New Albion, he called it—in England's name. The debate over the exact site of New Albion has been peppered by forgery, fracas and false claims, including the "discovery" in 1937 of a phony brass plate. But there is little hope of settling it beyond all question. Queen Elizabeth acquired Drake's personal log upon his return, keeping it secret to avoid trouble with Spain, and it has not been seen since.

The *Golden Hind* took 68 days to cross 7,000 miles of Pacific, touching first at Palau in Micronesia and then at Mindanao in what Spain had just named the Philippines—after archenemy Philip II. Near the Celebes, Drake's extraordinary feat of navigation in chartless waters almost ended tragically when the *Golden Hind* grounded on an isolated reef surrounded by deep water. They could not get off, and most of the crew had prepared for a slow death when, the following day, a wind shift and a high tide floated the *Hind*, and she proved miraculously without serious hull damage.

"Is our queen alive?" he said

Ten thousand mostly unrecorded miles—from Java round what was not yet called the Cape of Good Hope, up the slave coast of West Africa, past Spain and Ushant—still separated them from home. But we know Drake's first words when, on September 26, 1580, the *Golden Hind* at last encountered English fishermen off the Scilly Isles. "Is our queen alive?" he called.

Another monarch might perhaps have felt obliged to punish his depredations among Spanish shipping, word of which had long since reached Europe, stirring Philip's demands for restitution. Elizabeth did do some diplomatic maneuvering, worried that too much public approval would further anger the Spanish monarch, but she was royally pleased with Drake.

His booty—worth a quarter of a million Elizabethan pounds, less the 10 percent she secretly granted him—was soon surrendered to the Crown. All over again, Drake became a national hero and now a court favorite

as well. It was then that the queen had Drake knighted, musing mischievously as he knelt before her that instead of having him dubbed "Sir Francis" she could quite as easily have had his head lopped off with the sword, a course that King Philip had specifically urged upon her. Drake bought himself a big country estate, Buckland Abbey, and became a member of Parliament and mayor of Plymouth. Still, he found time for a few more raids on Spanish holdings in the New World. Returning from one of them he destroyed a Spanish fort in St. Augustine, and moving up the coast, he picked up desperate English colonists from Roanoke Island to ferry them home.

Philip II did not take action against heretical England because he was deep into a campaign to recover the breakaway Protestant provinces of Holland—for Spain, the tactical equivalent of America's Vietnam War. But by 1586, the long-threatened conflict between Philip and Elizabeth seemed inevitable, and a pair of exploits soon secured Drake's reputation as a naval hero twice over.

The first, in 1587, was an astonishing raid on the Spanish shipping assembled in the Bay of Cádiz as part of Spain's preparation for an attack on England. In command of a small fleet, Drake had been prowling along the Iberian coast, trying to ferret out Spain's plans for war, when he learned of the fleet's whereabouts. The Spanish ships were at anchor in a confined harbor, backed by shore batteries and attended by maneuverable armed galleys. Nobody except Drake, who believed in tactical surprise, would have had the audacity to attack them. When he did, it seemed a breathtaking gamble—and turned out to be a masterly display of cool courage and world-class seamanship. His fleet sailed straight in on a following breeze, right past the guns onshore, and sank or drove off the galleys. Then the English spent hours dashing in and out among the Spanish ships, eventually setting fire to many of them.

In all, 39 Spanish ships were sunk or put permanently out of commission, delaying Philip's war preparations. All Europe was stirred by the exploit. "Singeing the King of Spain's beard," Drake called it, and everyone followed suit. To this day in England, schoolchildren know it as such. To this day, partly because of it, Britons vacationing on Andalusian beaches sometimes find Spaniards less welcoming than they hoped.

On the way home from Cádiz, Drake's flotilla captured the *San Felipe*, the king of Spain's personal treasure ship, bound home with a cargo of pepper, calico, cinnamon, cloves, ebony, silk, saltpeter, china, indigo, nutmeg, gold and silver, not to mention 22 brass cannon, scores of iron cannon and 659 passengers who could be richly ransomed. The loss of the *San Felipe* was a second terrible humiliation for the proud Spanish. On Philip's orders, the duke of Medina Sidonia, a noble soldier who knew little about sea warfare, completed the assembly of a huge, brand-new and terrifying navy—*la Felicissima Armada*—set to sail northward. Its declared aim was to pick up thousands of Spanish troops in

Highly dramatized scene painted in the 1500s shows English fire ships attacking Spanish vessels anchored near Calais. In fact, the Spanish dodged the fire ships; in doing so, they left the harbor and a westerly wind blew them beyond contact with their troops.

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Drake bought his home, Buckland Abbey, in 1581, after being knighted for circumnavigating the globe.

Dunkirk, there as a result of the war in the Low Countries, and ferry them across the English Channel. Once landed, they would have Protestant England and arrogant Elizabeth at their mercy. It was July 1588. Under command of the fleet admiral, Lord Howard of Effingham, British ships, though outsized and outnumbered, were ready, and it was at this point that Drake made his remark about finishing that game of bowls.

Or did he? Probably not. The remark was first quoted in 1736, a century and a half later. Besides, on the particular afternoon in question, there was not a thing that Drake could have done about the Armada; his part of the combined British fleet was locked up in Plymouth Harbor by a wind blowing out of the south.

In the nine-day running sea fight that followed, the heavier Spanish ships never succeeded in coming into close quarters with the faster, better gunned English, and the English inflicted little damage on the Armada. They did herd it along eastward, and when it finally anchored at a point where Spanish troops might have been taken aboard, English fire ships forced the Spanish to cut their anchor lines. Then a steady wind from the west blew the Armada eastward, beyond hope of return or of carrying troops anywhere.

Through all this, Drake, in *Revenge*, commanded a quarter of the English fleet and did characteristically bold service. Because he was already so famous, he perhaps has been given more credit than was his due. But nowadays Drake debunkers tend to accentuate the negative and, with regard to the Armada, concentrate on the *Rosario* incident, the one thing that Drake did that stirred angry criticism from a few contemporaries. On the first night after the Armada had been engaged, Drake, under orders from Lord Howard, was leading the fleet eastward along the English Channel, keeping track of Medina Sidonia's ships. He was supposed to mount a light on the *Revenge*'s sternpost so the rest of the English ships could follow him through the darkness. But he veered off secretly (later saying he had seen some sails) and then found, and took the surrender of, a badly crippled Armada treasure ship, the *Rosario*. The English fleet was left to its own devices during a windy Channel night. Drake, it was claimed, had more pressing matters on his mind: namely greed.

England and the queen were delighted to receive the bulk of the *Rosario*'s treasure, however. It was used to help pay the cost of the Netherlands' soldiers still busily fighting against Spanish invaders, and to pay for the building of nearly a dozen warships. That may be why, at the time, Drake's only serious accuser was Sir Martin Frobisher (SMITHSONIAN, January 1993), who was angry because he did not share in the spoils. Drake's behavior, Frobisher told the High Lords of Admiralty, endangered England's cause, and it was prompted by the greatest flaw in Drake's character—his avarice.

A number of historians, professional and amateur, have since held that Drake's impetuousness and desire for riches did on this and other occasions overcome him. But after a close study of the papers of the day, a recent biographer, John Sugden, thinks otherwise. Brought out in 1990, Sugden's was the first serious biography of Drake since Sir Julian Corbett's famous hagiography from the 1890s, and it comes to Drake's support, not only in this incident, but in other character-questioning controversies that have resulted from recent revisionism.

For instance, was Drake heavily involved in John Hawkins' slave trade? No, says Sugden. In fact, he freed all the Spanish-held slaves he took. Had he been too Machiavellian in the renaming of the *Pelican* after Doughty's execution? Again, no. In Sugden's view, Drake simply had to flatter his weathly patrons, as was customary in Elizabethan times.

Still, the present age would radically alter the old view of Drake. His patriotism and his religious zeal as a Protestant do not stir a responsive chord in a secular world; his exhortations sometimes sound like bombast to a modern ear. By today's standards, revisionists like to say, Drake was little more than a licensed pirate and a sometime slave trader, a man responsible for shedding much blood, the leader of ventures that were sometimes fiascoes morally, tactically and even financially. Sugden points out that the Elizabethan navy, as well as exploration at the time, was regularly paid for by investors hoping for gain. Drake began as a corsair, but he came to command large forces of men and ships in Elizabeth's name and was privy to the highest councils of his country. But Drake's muscular nationalism has been

long out of favor, and we now tend to see the outward course of empire as at best a tawdry enterprise.

When I went down to Plymouth to look at Drake's huge bronze statue for the first time in 40 years, I met a Spaniard, and once we had fallen into conversation, I told him I had just been to see Drake's great manor house, Buckland Abbey, which stood nearby. I thought that four centuries might have softened the Spanish view of their onetime scourge, but I was wrong. "Ah . . . *el Draque.*" He almost spat the words out. "The dragon." And he stirred sugar into his coffee in a menacing way. "This house you speak of," he went on. "It was built with stolen money. Our money. It is still not forgiven."

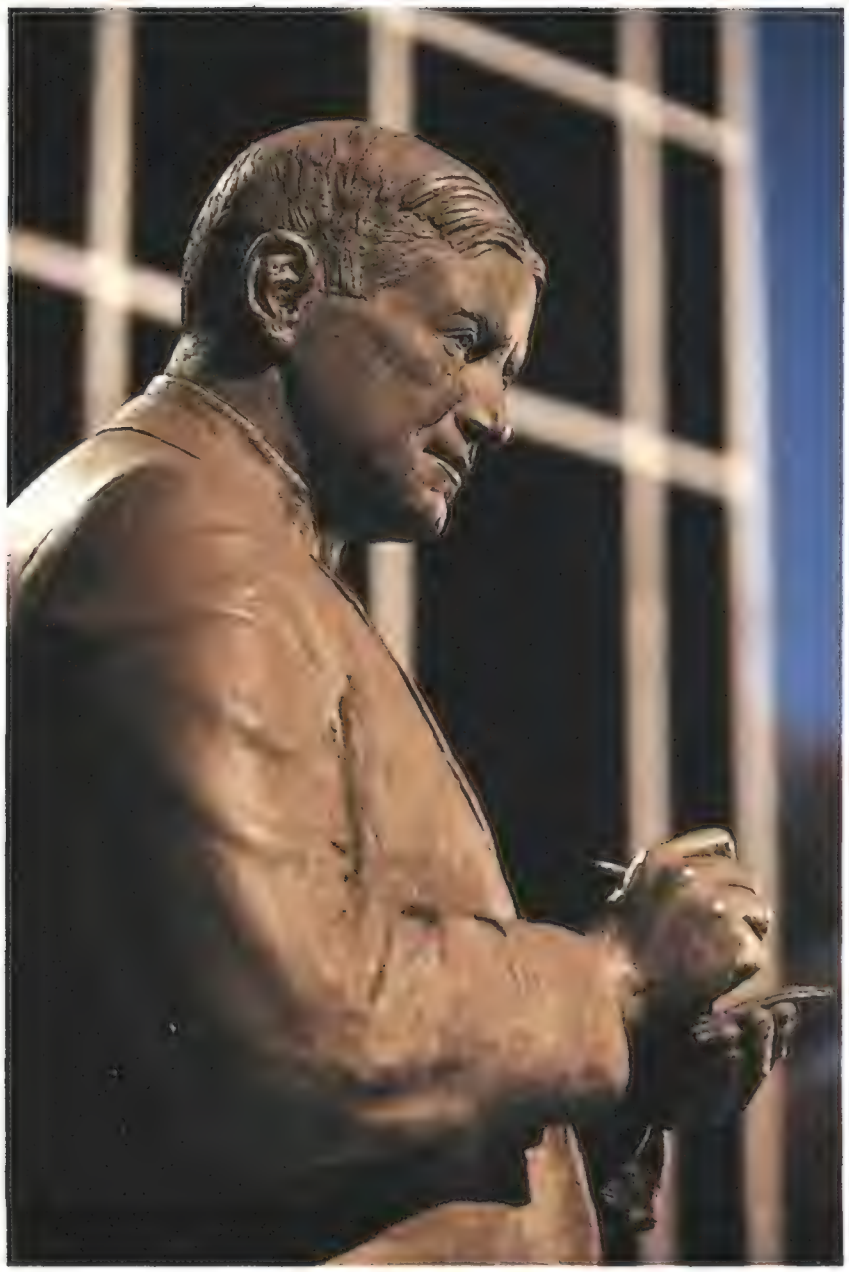
It is now 400 years since the little captain general died off Puerto Bello, Panama, suffering from dysentery, then known as the "bludie flux." Despite arguments over his reputation, a group recently came forward with plans to find his coffin and bring his body home.

Memories of Drake do rather run to blood, guns and treasure. Yet there is in Devon a small and charming and very innocent memorial. It was created during the calm years after the circumnavigation, when Drake was mayor of Plymouth. During his tenure he became concerned—obsessed, even—with the problem of how the citizens of the fast-growing seaport might get their fresh water.

He designed and built a tiny canal—six feet wide, three feet deep and nearly 20 miles long. It still exists. Known as Drake's Leat, it snakes its way, mossy and green and now water-filled only after heavy rains, between one of the Dartmoor tors and the leafy suburbs of a great naval port. He completed it under budget and well inside the planned schedule. Residents of Plymouth who complain about water costs or water quality sometimes write letters to the local paper suggesting that old Drake's Leat be reopened.

The palace chocolate that offers the most admiring assessment of his life is still before me. Whether it eventually melts away or becomes a victim to my own sweet tooth, the man whom it memorializes has a reputation that may well change and change again. All one can say with certainty is that Sir Francis Drake occupies a pivotal place in British history—and even in world history—that assuredly will not vanish, even after yet another four centuries have gone by.

After Drake's death from "bludie flux" (dysentery) in January 1596, his body was consigned to the sea off Nombre de Dios in Panama, scene of his first successful raid. Grandiose painting was completed around 1903.



By Bruce Watson

If his life were a short story, who'd ever believe it?

Being locked up for embezzlement freed him to write, launching William Sydney Porter on a brilliant but boozy career as O. Henry

Guards, convicts and the warden agreed that prisoner No. 30664 was a model inmate. Embezzlement was his crime, they said, yet he didn't seem the type. A dapper, reserved gent with a slight Southern drawl, he worked nights in the prison pharmacy. He spent spare hours listening intently to inmates' stories. He did his time without complaint. The only odd thing about Will Porter was his writing. Alone after midnight, buried in a stillness of steel and concrete, he pushed his pen for hours at a stretch.

Sometimes he wrote to his young daughter. "Don't you remember me?" he inquired. "If you see a star shoot and say my name seventeen times before it goes out, you will find a diamond ring in the track of the first cow's foot you see go down the road in a snowstorm while the red roses are blooming on the tomato vines." More often he wrote stories, engaging yarns about hoboes, sheriffs and scoundrels. During his three years behind bars, he published three stories in magazines far beyond his Columbus, Ohio, prison, but neither his editors then nor his best New York friends later knew that the author was an inmate hiding behind a nom de plume that was to become world famous.

If the life of William Sydney Porter were written into a short story, literary critics would scoff. Imagine a frail North Carolina boy going West to live and loaf on a Texas ranch. Too artificial. Fancy a foppish bank teller, charged with embezzlement, fleeing to Honduras to hobnob with fugitives. Too contrived. Conceive of an ex-convict rising to literary renown in only nine years, then dying in a New York hospital with 23 cents in his pocket. Too sentimental. Sounds like some O. Henry story.

When he died in 1910, O. Henry was in the pantheon of American writers. These days critics regard him as a clever hack. A few of his works are anthologized, and his masterpiece, "The Gift of the Magi," is a Christmas classic, but the rest of his stories, some 250 of them, sit unread on library shelves. Yet of all his tales, each with his signature surprise ending, his own story is the most surprising. If his life seems a bit contrived, that may be because William Sydney Porter made it all up on the fly. Charming his friends, exasperating his editors, neglecting his family, he transformed himself into the peculiar character called O. Henry.

There are two protagonists in his story, a writer and a rascal. The writer was born in prison; the rascal was born, friends said, "with a wall around him." The son of a North Carolina doctor, Will Porter was a child of the Civil War, haunted all his life by a sinister character—tuberculosis. In 1865, when he was 3, TB killed his mother. Sent to live with an aunt, he became a dreamy, devilish boy. Like the freckled brat in his story "The Ransom of Red Chief," who terrorizes his kidnappers so thoroughly that they actually pay his father to take the kid back, young Will lived for dime novel adventures. He was also

blessed with a brilliant mind and a frighteningly fertile imagination. At school, he amazed teachers by doing sums with his right hand while sketching with his left. His precocious cartoons earned him a scholarship to a North Carolina college, but his aunt couldn't afford the cost of books and supplies. Instead, he filled prescriptions at his uncle's drugstore in his native Greensboro to become a registered pharmacist. He might have remained so had he not, as a 19-year-old, developed a suspicious hacking cough. Feeling trapped behind a drugstore counter and fearing he had TB, he jumped at a family friend's offer of work on a Texas sheep ranch.

Texas in the 1880s was a rascal's dream, a land of mustachioed outlaws, girls in dimity and wide-open spaces. Dozens of O. Henry's stories are Westerns, filled with slang and swagger, though he was probably faking it. Depending on who you read, Porter either busted broncos with the best of them or he was a consummate tenderfoot. But there can be no argument that his time on the ranch served as his education. He roamed the premises toting a dictionary, devouring the family's well-stocked library, writing stories and tearing them up in disgust. That greenhorn Will Porter, the rancher's wife complained, had "no sense of responsibility or obligation or gratitude." Yet he was already stylizing his adventures. "The weather is very good," he wrote home, "thermometer rarely rising above 2,500 degrees in the shade and hardly ever below 212. . . . The lonely cry of the coyote is

Memorial in Greensboro, North Carolina, O. Henry's hometown, includes statue of the writer (opposite) and book opened to a scene from his most famous story, "The Gift of the Magi." Sculptor is Maria Kirby-Smith.

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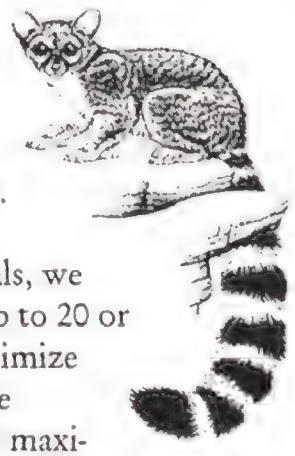

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At 19 Porter was skinny and sickly, known for mustache and fancy duds.

heard mingling with the noise of a piece of strong Texas bacon trying to get out of the pantry." For a time the ranch was home on the range, and Porter's hacking cough seems to have cleared up. After two years, when his benefactors sold the ranch, he lit out for the big city of Austin (pop. 10,000). There the trouble began.

Years later, when he was a famous New York author, fans clamored to know more about his past. Only once, when discussing fate with an editor, did he hint at dark secrets. "Some day I'll tell you how I fell heir to enough spare time to take up fiction seriously," he said. But then he stopped and stared out the window at Manhattan. The editor leaned forward in anticipation. This man called O. Henry simply never talked or wrote about himself. What was he hiding? "Perhaps it would be better to tell you now," O. Henry said, "so that . . . " The editor waited. And waited. The conversation evaporated. The subject was changed. Not until after his death did O. Henry's fans and friends learn of Will Porter's trouble in Texas.

In Austin, Porter loafed by day, working in a cigar store and a real estate office and learning to play the gui-

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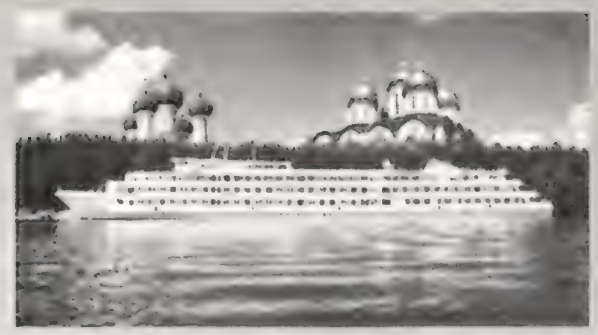
tar. By night, he went from saloon to saloon. A slight man—about 5 feet 6 inches—he could nevertheless drink with the big boys, often chugging a half-gallon of beer without coming up for air. Then, suddenly sociable, he'd spin stories and join midnight serenades through dusty streets. "Last Thursday night we loaded up a small organ on a hack," he wrote, "and with our other usual instruments made an assault upon the quiet air of midnight that made the atmosphere turn pale." Rakish, romantic and charming, he caroused through Austin for a dozen years or so. Not even marriage, which he turned into adventure by eloping, kept him home nights. But with time, Texas became a cage. His frail wife, Athol, who had TB, grew frailer still after giving birth to their daughter, Margaret, in 1889. He was going nowhere as a writer. He'd sold humorous sketches to magazines, but at ten bucks a throw they would scarcely support his dreams, let alone a young family. And so he was trapped behind a counter again, having taken a job as a bank teller.

Austin's First National Bank was a cash-and-carry operation. On the Texas frontier, banking laws were lax and audits few. Get your hands on the cash and you could carry it until you were caught. Porter once spent two days hunting a $100 shortage in his till before a bank officer admitted he'd "borrowed" the money and forgotten to write an IOU. "Sorry I gave you such a hunt," he said. Accounting was casual, especially for Porter, who whiled away dull hours sketching faces from his

At 21, transplanted to Austin, a healthier Porter (left front) sang in the Hill City Quartet, much in demand for church picnics and weddings.



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"The Passing of Black Eagle," a comical short story about a hobo who poses as a train robber, is one of the tales that reflect his time in Texas.

teller's window. Then, in 1894, an examiner discovered a serious shortage in his till.

Will Porter an embezzler? How could it be? He was such a gentleman, friends said, "the last man you would ever pick for a crook." Sure, he drank and played poker, but a married man would have too much to lose. What would be his motive?

No one knows. What we do know is that while he worked at the bank, Porter spent nights writing his own weekly paper, the *Rolling Stone*. His cartoons and spoofs made it a modest success at first, then the paper started losing advertisers. Always in need of ready cash, Porter even dug for lost treasure in a nearby canyon. Wouldn't a teller be tempted to tap his till? Fellow employees pleaded his innocence, but Porter was being accused of embezzlement. Panicked, he resigned. After his father-in-law negotiated a settlement, making good $1,500 of the bank's shortage, a grand jury cleared Porter of all charges. Yet the scandal refused to die. Probing a bit deeper, a federal investigator found First National's books in a shambles. Bank officials knew an easy scapegoat when they saw one. So although he had started a new life in Houston as columnist and cartoonist for the *Post*, Porter was swiftly indicted, arrested and released on bail. A gentleman wouldn't skip bail, would he?

On a sultry June day in 1896, following a bibulous send-off from his Houston colleagues, Porter boarded a train to take him to Austin. He was heading home to a nightmare. He was about to be tried for embezzling $4,702.94. His wife was still terribly sick. As his train rattled across the Texas hill country, he could see no surprise ending to this story. He would have to contrive one. About 50 miles out of Houston, he left the westbound train at a whistle-stop and boarded an eastbound coach to New Orleans. A few weeks later, he caught a steamer heading south. In his stories, he called his destination "Coralio." It was, he wrote, "an insignificant town in an insignificant republic lying along the by-ways of a second-rate sea." On maps, it was Honduras, and possibly just by coincidence, it had no extradition treaty with the United States. O. Henry later filled an entire book, *Cabbages and Kings*, with stories of Coralio, but he was faking it again. In his tall tales, expatriates unwittingly abet rebellions, court native girls and try to forget loved ones back home. In reality, Porter spent three months doing little but drink. Befriending a fugitive train robber, he lived off the man's largesse. He wrote home, begging his wife to join him, but poor Athol had a temperature of 105. He was perhaps an embezzler, certainly a fugitive, but he couldn't let his wife die alone. He arrived back in Austin

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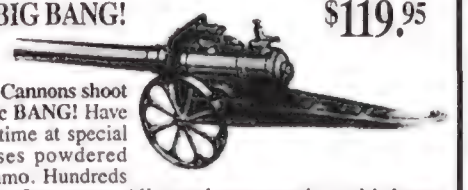

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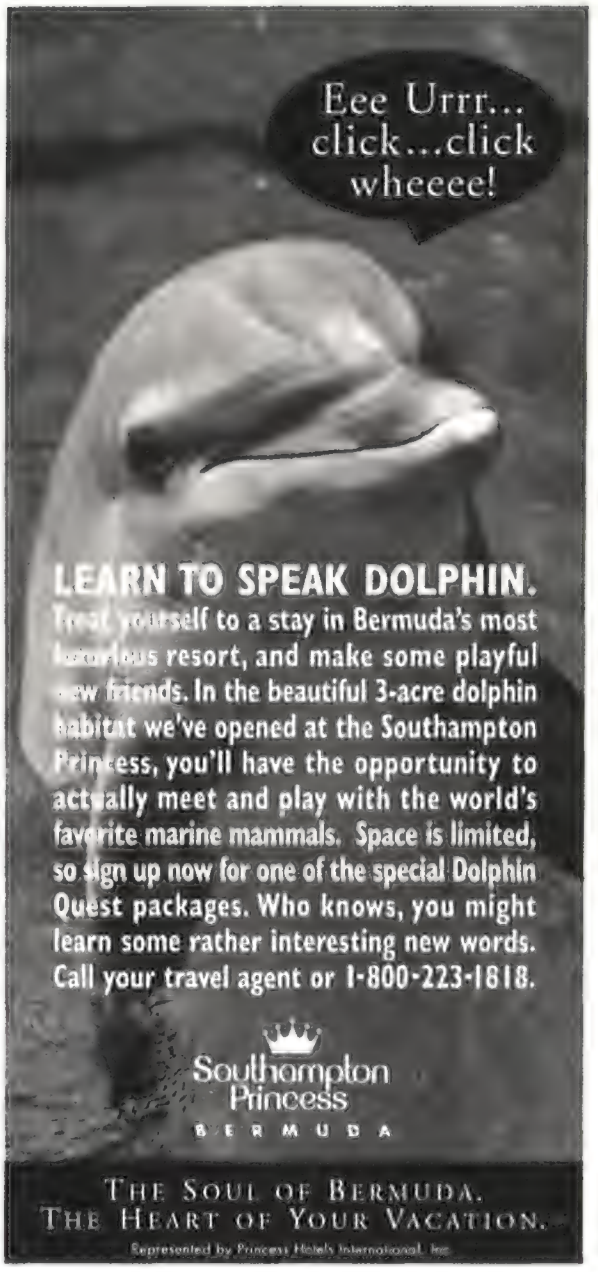
on January 23, 1897. He had another adventure under his belt, but he also had a hard time finding anyone who still believed him innocent.

In downtown Austin, a stately Victorian building serves these days as a University of Texas administration building, O. Henry Hall. But in 1898 it was a courthouse, the venue for *United States* v. *William Sydney Porter.* At his trial, Porter seemed numb. Since his return, fate had toyed with him. He had sold a Western story to a national magazine, his first major sale. The editors had asked for more, but Athol and the aunt who had raised him had both died. He had a child to raise on his own, and now his character was on trial. When bank officials testified that at least two checks had disappeared into his hands, Porter refused to defend himself. He sat, the court reporter noted, "with his chair tilted backward and his hands clasped behind his head, looking on in a somewhat bored manner."

Charges of pocketing larger sums were dropped, but he was convicted of stealing $299.60. The jury deliberated for less than a day. His biographers have never agreed: some say the noble writer took the rap for someone else; others say the sly rascal was a crook. The truth, as always in O. Henry's story, is negotiable. He certainly had the motive and the open till, but he also had a reputation for honesty. If he was innocent, why did he run? If he was guilty, why did he return? To this day, O. Henry's character remains a question of faith.

On April 25, 1898, on the very day that the Spanish-American War began, Porter was sent to the federal penitentiary in Columbus to serve five years. Thrown among hardened criminals, he was broken and humiliated. Only once, when some medicinal alcohol disappeared from the prison pharmacy, did he mention his crime. "I am not a thief and I never stole a thing in my

The author read O. Henry in high school, forgot him, and was delighted to rediscover him for this article.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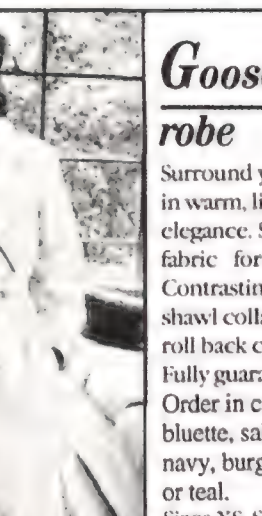

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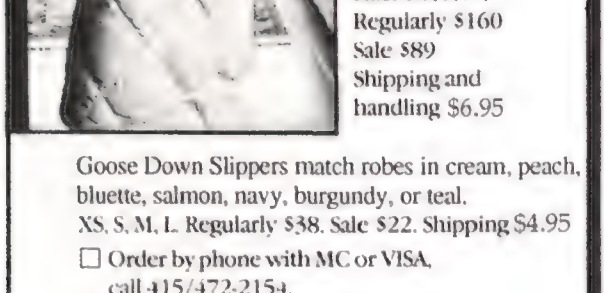

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life," he protested. "I was sent here for embezzling bank funds, not one cent of which I ever got. Someone else got it all, and I am doing time for it." Yet prison was the crucible that turned William Sydney Porter into O. Henry. With no job, no prospects and no saloons to dilute his talent, he molded a distinctive style into mature fiction. He wrote a dozen stories in prison and sent them to publishers, using an inmate's sister as intermediary. Afraid to use his real name, he took a pseudonym. Stories on its origins vary. Did he borrow it from prison guard Orrin Henry? Did he lift it from New Orleans' society columns, as he would later claim? Did the name come from a pharmaceutical guide citing French doctor Etienne-Ossian Henry? When pressed, he said that the *O* stood for Olivier, but by whatever name, he had become a writer.

With time off for impeccable behavior, O. Henry was released after 39 months. From Pittsburgh, where his daughter had moved with his in-laws, he sent more stories to magazines, impressing editors, who gave him $100 to come to New York. The following spring, O. Henry, almost 40, an ex-convict, widower and unknown author of a dozen stories, first walked among the New Yorkers he would call "the four million." He would not be Will Porter again until the name was chiseled on his gravestone.

At the turn of the century, New York was an urban chapbook filled with characters and stories. Its streets teemed with pushcarts and peddlers. Its tenements overflowed with seamstresses and waifs. Its stores bustled with poor shop girls and wealthy shoppers. Here in what he called "Baghdad by the Subway," O. Henry found the perfect setting for his best work. "I would like to live a lifetime on each street in New York," he said. "Every house has a drama in it." Living in a small hotel room that looked out on an air shaft, he began writing, and prowling the streets. Still shy when sober, he made taverns his guest room,

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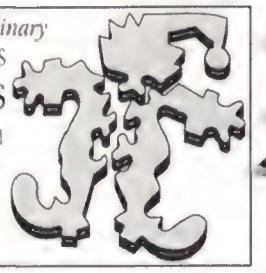

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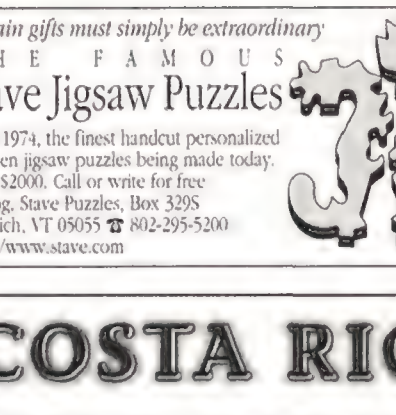

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drinking two quarts of whisky a day. He had taken to calling strangers "Colonel," and he often bought them drinks just to hear their stories.

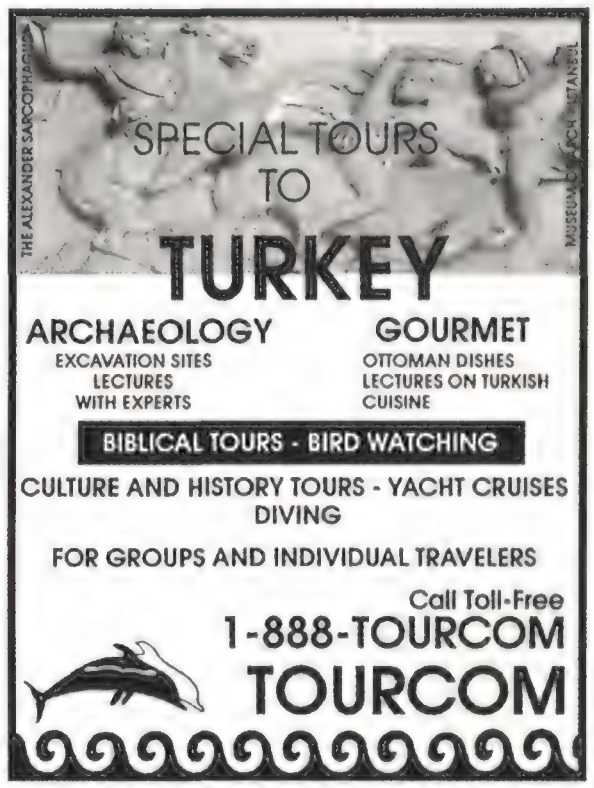
During his first year in New York, he published 17 stories and was perpetually broke. A few years later, he published 66 stories in 12 months and was perpetually broke. At the apex of his career, he was earning $500 per story and was perpetually broke. Cash flowed through him like whisky. He often handed $20 bills to bums, and even paid their medical bills. Constantly asking editors for advances, he wrote not for his muse but for money. "Writing stories is my business," he said. "It is my way of getting money to pay room rent, to buy food and clothes and Pilsener. I write for no other reason or purpose."

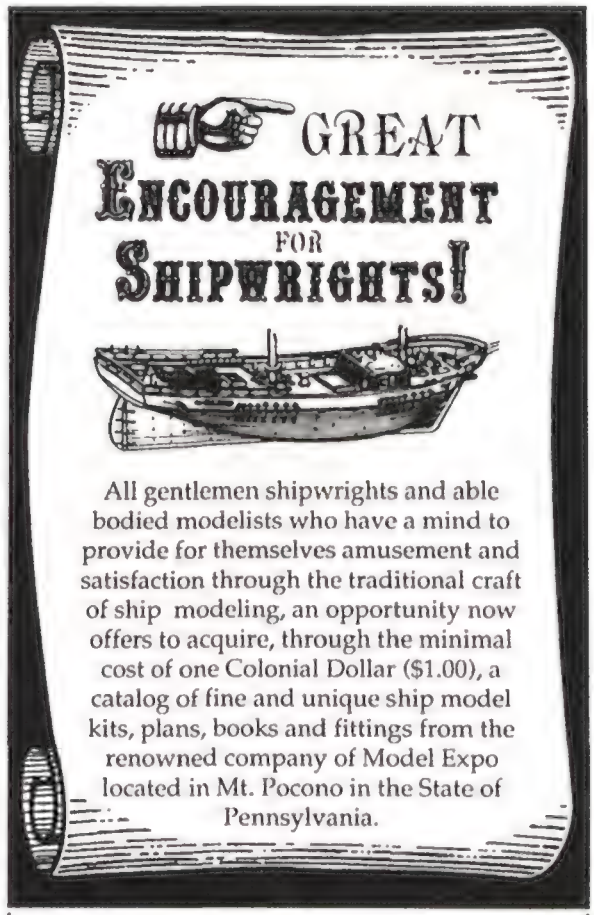
Cynical and streetwise, he nonetheless beguiled readers of all stripes. "No [other] writer in the language seems clever immediately after one has been reading O. Henry," critic Carl Van Doren once noted. His best stories begin with insights into his adopted home. In "The Furnished Room," he writes: "Restless, shifting, fugacious as time is a certain vast bulk of the population of the red brick district of the lower West Side. Homeless, they have a hundred homes. They flit from furnished room to furnished room, transients forever—transients in abode, transients in heart and mind." His characters, though cut from similar molds, are masterfully sketched in a few sentences. In "The Trimmed Lamp," he sums up a shop girl's expression: "It is a look of silent but contemptuous revolt against cheated womanhood; of sad prophecy of the vengeance to come. . . . It is a look that should wither and abash man; but he has been known to smirk at it and offer flowers—with a string tied to them." And few are the O. Henry stories lacking an edge of comic wit. Describing the protagonist of "The Fool Killer," he notes, "Of course he is a myth, like Santa Claus and Jack Frost and General Prosperity."

Just before her death, wife Athol posed with Will and daughter Margaret.

O. Henry's timing was as sharp as his literary spice. His stories often appeared in magazines alongside exposés of urban corruption. While muckrakers detailed "the shame of the cities," O. Henry, without politics or preaching, gave city life a human face. Soon editors went looking for this new talent whose real name nobody knew. Searching for O. Henry "was a job somewhat akin to tracing a lost person," one editor lamented. He lived in a series of hotels and was more often out walking the streets than at home writing. Even when editors found him, he seemed eager to lose himself.

In 1903, Joseph Pulitzer's *New York World* hired O. Henry to write a weekly story for its Sunday paper. Editors had no idea how much work they had taken on. Writing was O. Henry's business, but he was a shiftless employee and an indifferent boss. His stories were chronically late, and *World* editors had to plead, prod and push him to the writing table. Once asked if a story was done, he answered, "Certainly, Colonel, here's the manuscript." He tossed over a piece of paper with a title and the numeral "1" at the top. "And what's more, I can go right on with this story," he said. He very slowly wrote "Page 2" on the next sheet, then "3," "4," and "5" before saying, "I think I shall stop here, if you don't mind; and rest." Yet once he set his mind to write, stories poured out of him. If many of

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his works look like first drafts, they are, but few writers have produced such polished prose under the white heat of deadlines.

Late in 1905, O. Henry agreed to write a Christmas story for the *World.* The due date passed and editors had read only excuses. Hoping for a glimpse of the work, an illustrator trudged through snow to find O. Henry. He hadn't written a word. When the artist pleaded for a suggestion to start his drawings, O. Henry said, "I'll tell you what you do, Colonel. Just draw a picture of a poorly furnished room, the kind you find in a boarding house or rooming house over on the West Side. In the room there is only a chair or two, a chest of drawers, a bed, and a trunk. On the bed, a man and a girl are sitting side by side. They are talking about Christmas. The man has a watch fob in his hand. He is playing with it while he is thinking. The girl's principal feature is the long beautiful hair that is hanging down her back. That's all I can think of now. But the story is coming." But the story did not come. Finally, a few hours before the final deadline, O. Henry told his editor to lie down on the couch while he wrote. He took out a bottle of Scotch, set another story aside, and began. Three hours later he finished "The Gift of the Magi." It was set in type that night. The tale of a man who sells his precious watch to buy a hairbrush for his wife, who has sold her gorgeous hair to buy him a watch chain, is still reprinted in magazines each Christmas. Translated into several languages, it is truly a Christmas story for the world.

A few years after he had been paroled from his past, O. Henry was the talk of the town. He was sought out by fans and besieged by requests for interviews. To his horror, one magazine revealed that his real name was Will Porter and printed a photograph of him from Texas. Somehow his crime remained a secret, but the celebrity was excruciating. Afraid an old acquaintance might step forward to call

Last portrait, in 1909, was only one O. Henry sat for after he did time.

him a crook, he shied away from social scenes, earning the nickname "The Elusive Pimpernel." Yet he continued to churn out stories.

Many were formulaic, others were gems like "The Last Leaf." The tale tells of two women in a Greenwich Village flat, and their neighbor, an aging artist named Behrman who dreams of painting a masterpiece. When one woman is stricken with pneumonia, she ties her fate to the last leaf of ivy visible through her window. "When the last one goes, I must go, too," she says. But the winds blow and the leaf hangs on, giving her the determination to do the same. Only after she has recovered does she learn that Behrman has painted the leaf, his masterpiece, on the wall facing her window, and succumbed to pneumonia from the effort.

At the height of his creative powers, O. Henry could spin a story out of thin air. He often stood at his window near Gramercy Park and studied passers-by, conjuring entire lives from their fleeting expressions. Once asked why he had invited a downtrodden woman to supper, he answered, "When I see a shipwreck, I like to know what caused the disaster." What had he learned? "Nothing but the glow that wrapped her face when the soup came," he said. "That's the story."

As deadlines and drinking took their toll, O. Henry's well of stories began to run dry. His works were collected in books, but he sold the rights to each for a few hundred dollars, leaving him still broke and in declining health. In 1907, he married a North Carolina woman he'd known as a child and had courted by correspondence. A Southern aristocrat, Sara Porter tried to domesticate her bohemian husband. The couple moved out of the city to Long Island, but no one could take the city out of O. Henry. An editor seeking stories soon found him holed up in a New York hotel. Couldn't stand the country, he joked. All those birds and cows distracting him. The marriage soon dissolved into polite distance, after Sara returned to North Carolina. "No one could manage that man," his wife said many years later. "He was a law unto himself."

Weary of his own formulas, O. Henry dabbled in other genres. Editors urged him to write a novel. He vowed to try, then couldn't focus his attention, though he did turn out a lengthy and brilliant story about the city of Nashville, called "A Municipal Report." In 1908 doctors diagnosed diabetes and told him not to drink anymore. He mocked the diagnosis in a story. When a doctor demonstrates the danger of drink by taking a patient's blood pressure before and after imbibing, the patient asks if one test will be sufficient, adding, "Have one on me and let's try the other arm." But as his reputation grew, O. Henry's output withered from a story every week to one a month. In his final year, he sent out stories a few pages at a time. "I'll go home and knock out the rest tonight if I can hold a pencil," he wrote. "I am hugging the radiator with an overcoat on."

O. Henry memorabilia is displayed on his desk in Austin's History Center.

In the summer of 1910, O. Henry collapsed in his hotel room. By the time a friend called an ambulance, he had recovered his charming facade. Checking into a hospital under the name Will S. Parker, he emptied his pockets and joked, "Here I am going to die and only worth twenty-three cents." Near midnight on June 4, just before losing consciousness, he muttered, "Turn up the lights, I don't want to go home in the dark." He died early the next morning of diabetes complicated by cirrhosis of the liver. He was 47 years old.

Death might have ended another writer's story, but O. Henry's ending needed a surprise. For the next decade, his reputation soared, while his wife and daughter shared the royalties. Five million copies of his books sold, a figure topped only by Kipling's works (SMITHSONIAN, January 1986). His secret came out in a biography and the notoriety added to his fame. His stories were translated throughout Europe and Japan. Russian critics ranked him with Chekhov. Closer to home, he was compared to Poe and Robert Louis Stevenson.

There are some final ironies. The small house where Will and Athol Porter lived in 1893 is now Austin's O. Henry Museum, drawing 15,000 people each year, many from overseas. In his old New York neighborhood, a few fans still drop into Pete's Tavern near Gramercy Park. There a plaque above a dark booth says that O. Henry wrote "The Gift of the Magi" in the tavern. Down the street, another plaque inside 55 Irving Place notes that O. Henry lived, and wrote "The Gift of

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the Magi" there. His publisher, Doubleday, established the O. Henry Awards in his name, each honoring a selection of the best American stories. Yet when talk turns to great writers, hardly anyone mentions O. Henry anymore. The fall began only a decade after his death.

As more cerebral writers came to the fore, O. Henry's stories began to be sneered at by critics. His endings were seen as contrived, his characters mere shells, his work just clever pulp fiction. H. L. Mencken dismissed him as a "cheesemonger," with a "smokeroom and variety show smartness." Though he is still well liked overseas, in his own country the censure continues to this day. Indeed, on his long shelf of stories, the real gems fill only a single volume. But the people who so easily dismiss him might be surprised to pick up that volume and read. Though he claimed to write for pilsener and pay, his joy in language, wit and ennobled tragedies suggest another motive. He wrote to keep his own spirit from sinking.

A man who wrote more than 250 endings deserves a fitting denouement. In his story "The Plutonian Fire," a hack writer seeks advice from a short story master. Fall in love, the master says. Then you'll understand human emotion. The hack falls in love but writes "sentimental drivel." Only after he courts, misuses and discards another woman does he write a brilliant love story based on her suffering. "I see the game now," he says. "You can't write with ink, and you can't write with your own heart's blood, but you can write with the heart's blood of someone else. You have to be a cad before you can be an artist." Was this writer's true character that of a cad or was he a genuine artist? It depends on which character you mean, Will Porter or O. Henry.

Before the embezzlement charge provided his life with a tragic twist, O. Henry was photographed behind the bars of his teller's cage in Austin.

Book Reviews

Illumination in the Flatwoods
Joe Hutto
Lyons & Burford, $25

To Joe Hutto, a wildlife artist from Florida, it seemed an intriguing opportunity, a chance to imprint and raise a few wild turkeys from eggs that had been exposed by tractors mowing over their grassy habitat. It eventually became something far different, a full-time job as the single parent of not a few, but more than 20, young turkeys through the difficult and dangerous first year of their lives. More than that, the opportunity became for Hutto a transforming and profound experience, one that demanded setting everything else aside for however long it took, a chance encounter that was for both him and the turkeys "love at first sight."

Hutto made sure that he was indeed the first sight each chick saw when it hatched, thus "imprinting" him as parent and protector. It happened with their eyes: "He raises his shaking wet head and looks me square in the eyes. In that brief moment I see a sudden and unmistakable flash of recognition." And thus he's hooked, off on an extraordinarily consuming journey of feeding and communicating (he seemed to talk turkey naturally), learning and exploring and growing.

The poults swarm around him, fall asleep in his lap; they want to touch and be touched. They let him know what he can wear (no red or purple, and they didn't much care for his beige shirt, either) and what he can eat in their presence (nothing besides apples). For Hutto the rewards are the rewards of parenthood—respect, attention, unquestioning love, pride in their development and accomplishments. When he sees them each morning "a small cheer goes up from the crowd"—in turkey talk, of course.

Hutto describes their daily walks as they explore together their Florida Panhandle home turf. The dangers in their habitat are not so much from man, for a change, but nature—predators and disease. Hutto builds a pen out of small-mesh wire, but it doesn't protect them from a rat snake that slithers through one afternoon to kill one, or from a weasel that takes three in a nocturnal raid. Red-shouldered hawks are a constant menace, and the young turkeys show an intense interest in anything in the sky, even taking note of planes a mile overhead. Rattlesnakes and copperheads live in the neighborhood; the turkeys instinctively give them the deference and space they deserve.

The author's odyssey evolves from a story of a man and his birds, of "me" and "them," to something more like a family tale, a story of "us." Hutto laments, in the low-key field-note style he maintains through most of *Illumination in the Flatwoods*, his inability to fly. "I consider my flightless condition to be inconvenient," he writes with the faintest hint of well-concealed humor, "and an overall handicap in this study."

You get the feeling that if he *could* fly he wouldn't do anything showy, just continue to cruise along with the flock and make the occasional note. Turkey and parent traverse their patch of Florida flatwoods at what he calls "wild turkey speed." This he defines as "that speed beyond which an organism becomes stupid on a scale proportional to the relative increase." Turkeys move at a pace that maximizes awareness while minimizing effort. "A wild turkey always proceeds as if he were in the perfect place at the perfect time."

Not a bad way to be, all things considered, and Hutto concludes: "I have never kept better company or known more fulfilling companionship. Our communication, although somewhat abstract, is completely satisfying, and our interests are identical: plants, insects, reptiles, birds, mammals, the odd bone, interesting artifacts."

He is at pains to defend turkeys against those who would slander their intelligence or character. Crows, for example, are forever being trotted out as the Mensa members of avian society, but Hutto gives the nod for smarts to wild turkeys—more complex socially, more curious, possessing a more complicated vocabulary. He also rejects the traditional libel that turkeys drown because they're too lunk-headed to lower their heads and come out of the rain. They in fact have a "rain posture," he explains—head up and body down, to minimize the exposed surface.

Inevitably, of course, Papa Hutto has to let go; it turns out to be harder than he ever imagined. By this time he's become about as close to being a turkey in human skin as nature permits—"I haven't started eating grasshoppers yet, but the smooth green ones, I notice, are beginning to look very attractive." The day comes when they decide against returning to the pen: soon they're not following him anymore, and he feels an old, strangely familiar sorrow—"some closed place deep within, where I must have stored ancient disappointments and betrayals, has been knocked ajar." Here was the empty nest at its most literal, leaving Hutto the parent simultaneously proud and desolate. He probably felt something similar when he finished this fine book.
Reviewer *Donald Dale Jackson* writes from his home in Connecticut.

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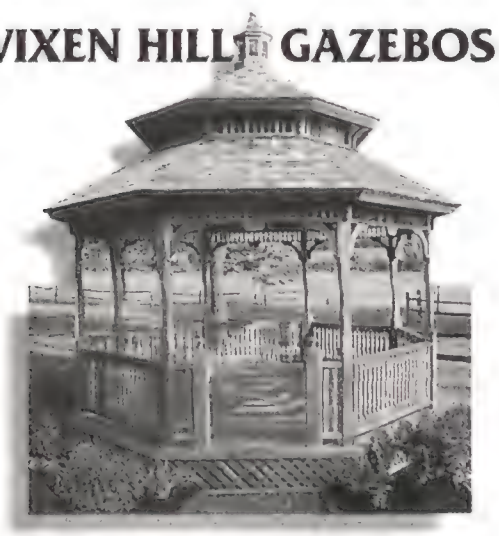

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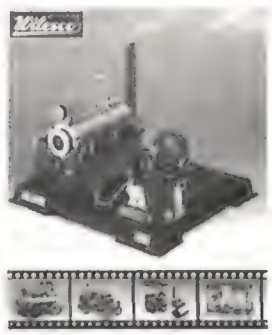

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By Richard Conniff

How I stuck my 'hand' in a fire ant mound for television and glory

Some time ago in the pages of this magazine, I lampooned a Texas politician who was so eager for television coverage that he stuck his hand into a fire ant mound on camera and held it there while promising to whip the fire ant problem for good. When another news crew showed up, the big buffoon did it all over again.

I was just having fun, beating up on one of our leading statesmen. It is what we high-powered media types do in lieu of honest work. But then I wrote the line that was to come back and haunt me. It was about my own investigation of the fire ant and how I'd decided not to stick my hand in a fire ant mound "on the theory that a working journalist should strive to be no more than half as dumb as a politician seeking office."

I guess I should have said a *print* journalist because soon after, by some malicious quirk of the fates, I became involved in television, and almost the first thing I was obliged to do was kneel in front of a camera while sticking my hand in a fire ant mound and saying, "Hello, my name is Richard Conniff." We did about 20 takes because, after the first few dozen stings, I had a little trouble remembering my name. Also the camerawoman kept talking about how beautifully the light fell on my contorted features. My hand became a mass of welts and pustules.

What I had entered was either the glamorous world of television or one of the outer rooms of hell. Officially, I was the coproducer and on-camera presenter for a documentary about fire ants. The crew referred to me as "the talent," usually in a context like, "Why is the talent always such an amazing idiot?"

I was convinced that my future lay in television, particularly the strange world of natural-history television. (Or maybe, in the standard script language of the genre, I should say the bizarre, mysterious and/or alien world of natural-history television.) So over the next year my left hand was attacked by killer bees and an Australian box jellyfish, either of which can cause an agonizing death in almost no time. Also two fingers got chopped off in transit.

But maybe I need to clarify a few things here. The hand I stuck in the fire ant mound while attempting to smile for the camera was in fact my own hand. But not even a television journalist is dumb enough to volunteer to be stung by killer bees and box jellies. (Though I can think of a few cases in which it might be a public service, especially if there were earnest interviewers nearby to ask questions like, "Bob, can you tell us what you're feeling at this terrible moment?") Anyway, the killer bee/box jelly victim was actually a prosthetic model of my left arm, which we had made for extreme close-ups in the fire ant film. It cost $3,000, and it had a slick little pump you could use to make the tendons on the back of the hand arch up in apparent agony.

I suppose purists would say we faked the close-ups, and I realize that this is a sensitive issue. Not long ago, a well-known natural-history filmmaker was attacked in the press for staging several sequences supposedly shot in the wild. Among other things, he was accused of "tucking a ptarmigan in his pocket to move it to a more picturesque spot for filming." So I want to state categorically that, in my entire television career, I have never tucked a ptarmigan anyplace.

But the truth is that we filmed most of the fire ant show in an apartment in Tallahassee, Florida. There were several good reasons for this, including the natural proclivity of fire ants to raid apartments. From a filmmaker's point of view, the problem with fire ants is that they are smaller than freckles, and when they are not colonizing someone's home, they generally live underground. The only really practical way to film them is on a set.

Our cinematography team consisted of a slight, grizzled cowboy in a black Stetson and his wife, a tall, voluptuous, ginger-haired woman with a certain resemblance to Betty Boop. They holed up in the apartment for several months, sending us occasional progress reports that exhibited a weakness for puns. I have no idea how they explained their "antics" to the landlord. All the windows were blacked out, and the only furniture in the place was a bed. The kitchen door was blocked off by a brace for immobilizing the cowboy's arm during a time-lapse sequence of a pustule erupting. Colonies of fire ants were thriving in glass-fronted cases, and the air was ripe with the smell of the preserved frogs the ants were eating.

My prosthetic left arm dominated the spare bedroom, with my wedding band slipped onto the ring finger for verisimilitude. Fire ants wandered among the artificial hairs and drove their stingers into the rubberized flesh, which never flinched, except under pneumatic command. The big crisis in filming was the day the exterminator made his rounds, and the cowboy and "Betty Boop" had to fling themselves bodily across the doorway to keep him out.

Anyway, the film got made, and it premiered on a Sunday night just after a James Bond movie. The Nielsen ratings were respectable, and at least one aspect of my performance caught the eye of other producers: my prosthetic left arm has gone on to mayhem and gore in a series of other natural-history films. Meanwhile, I am waiting by the phone for another chance at television immortality, and I am keeping my options as a print journalist open.

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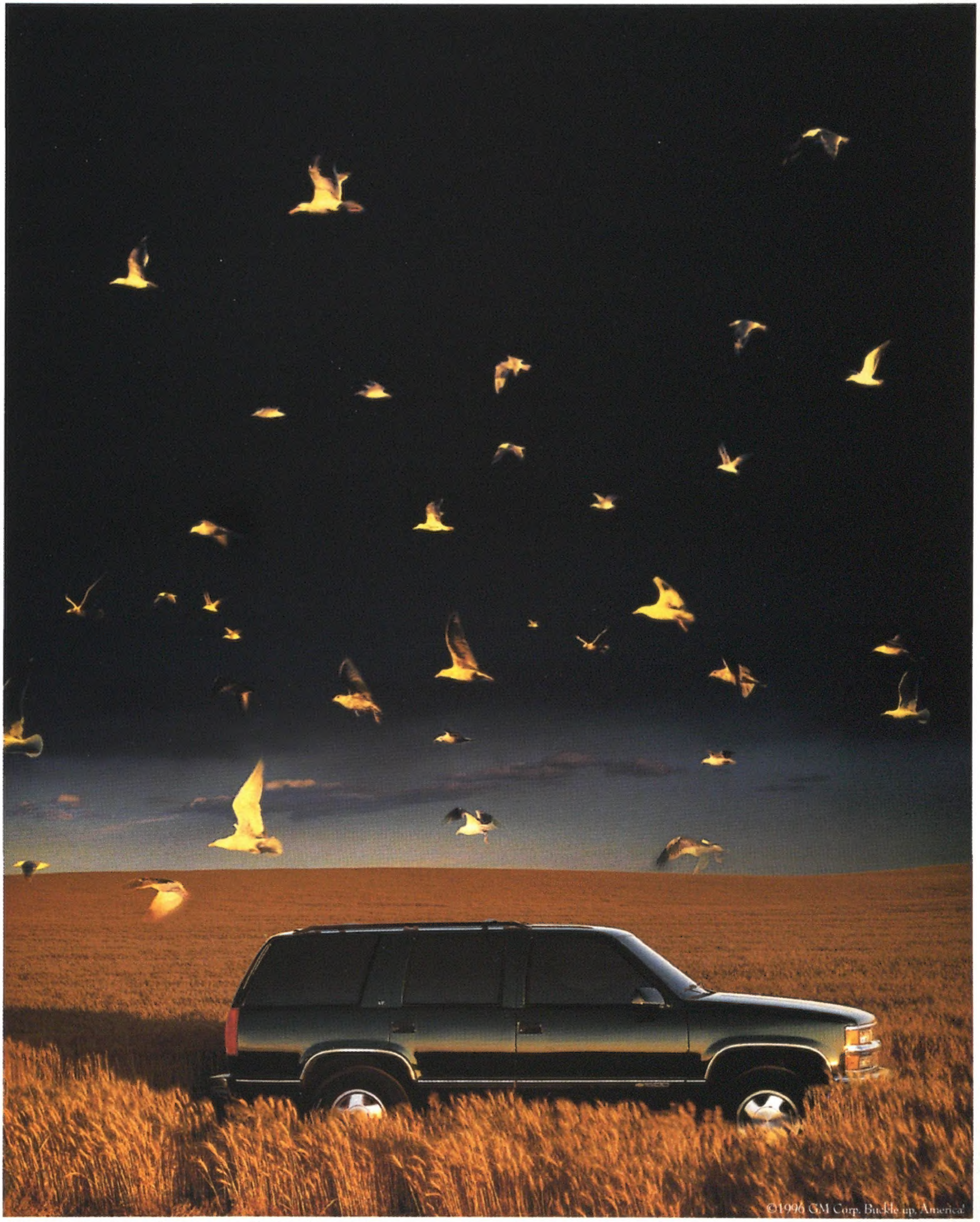
IS NOT SO MUCH WHERE WE STAND, AS IN WHAT DIRECTION WE ARE MOVING. -Oliver Wendell Holmes, Jr.



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